#WWDC18

Accessing Health Records with HealthKit

Session 706

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Peyton Randolph, Health Software

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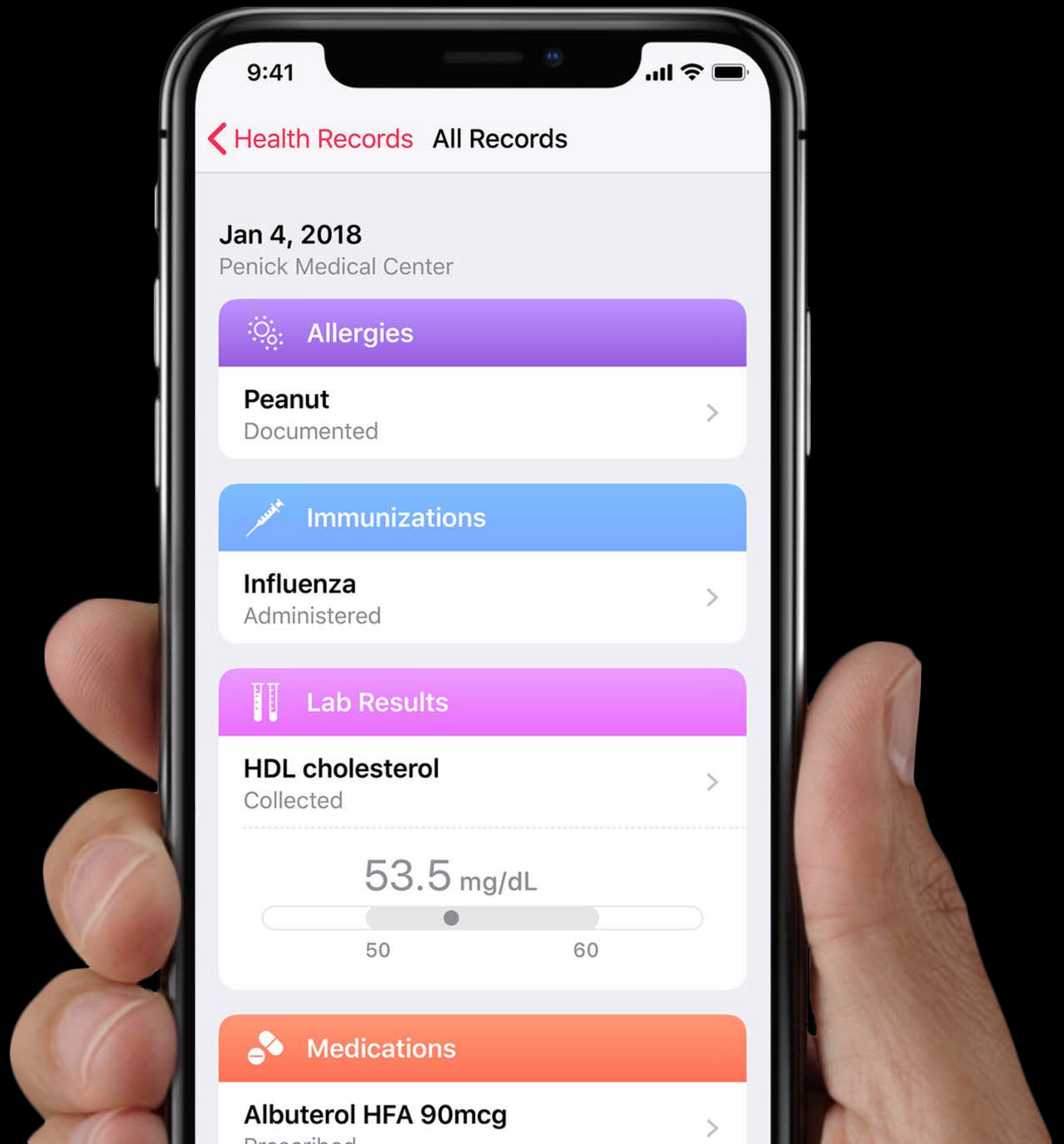
9:41
Health Records
All Records
Jan 4, 2018
Penick Medical Center
Allergies
Peanut
Documented
Immunizations
Influenza
Administered
Lab Results
HDL cholesterol
Collected
53.5 mg/dL
50
60
Medications
Albuterol HFA 90mcg

500+

U.S. Hospitals and Clinics

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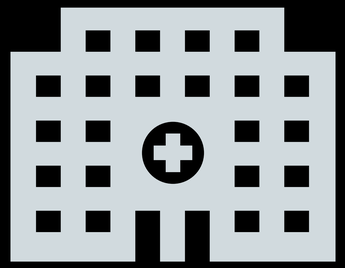
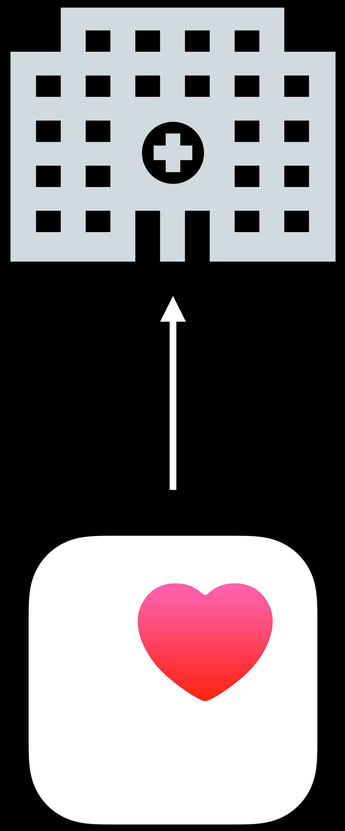
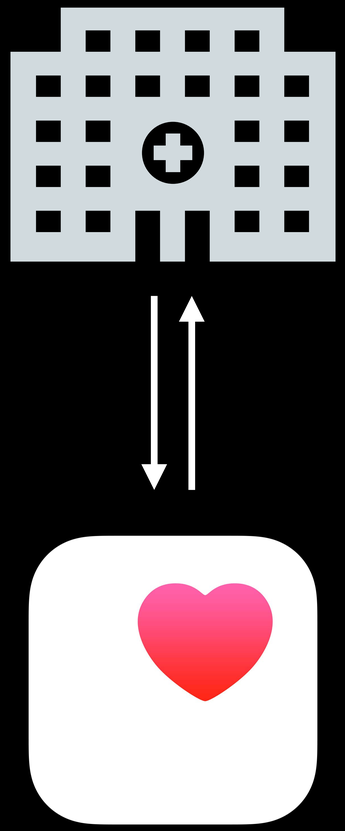
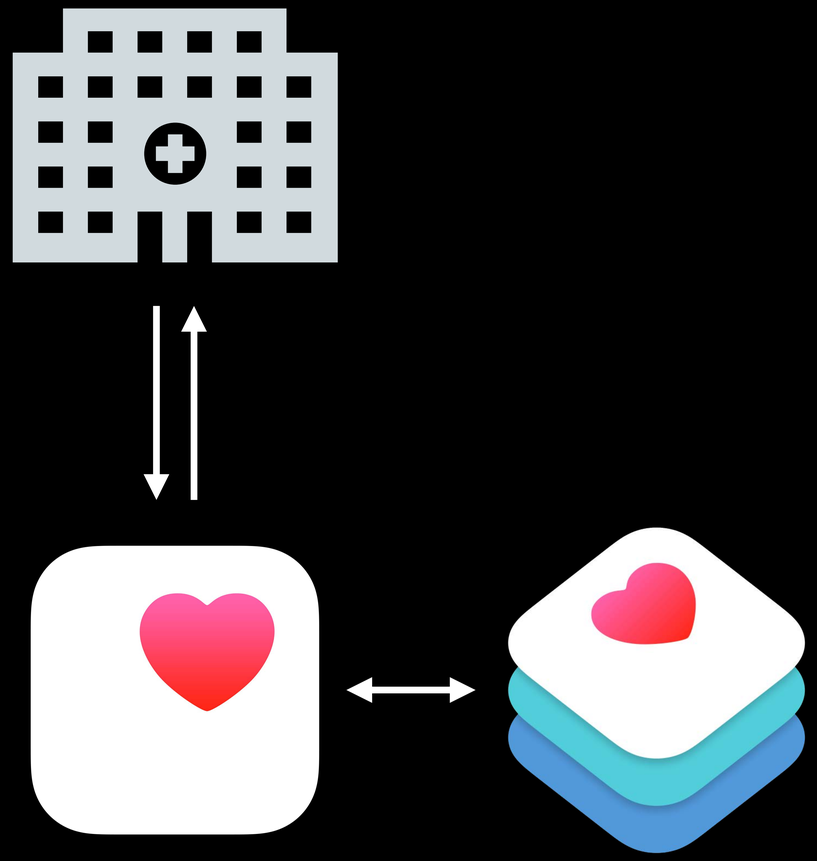
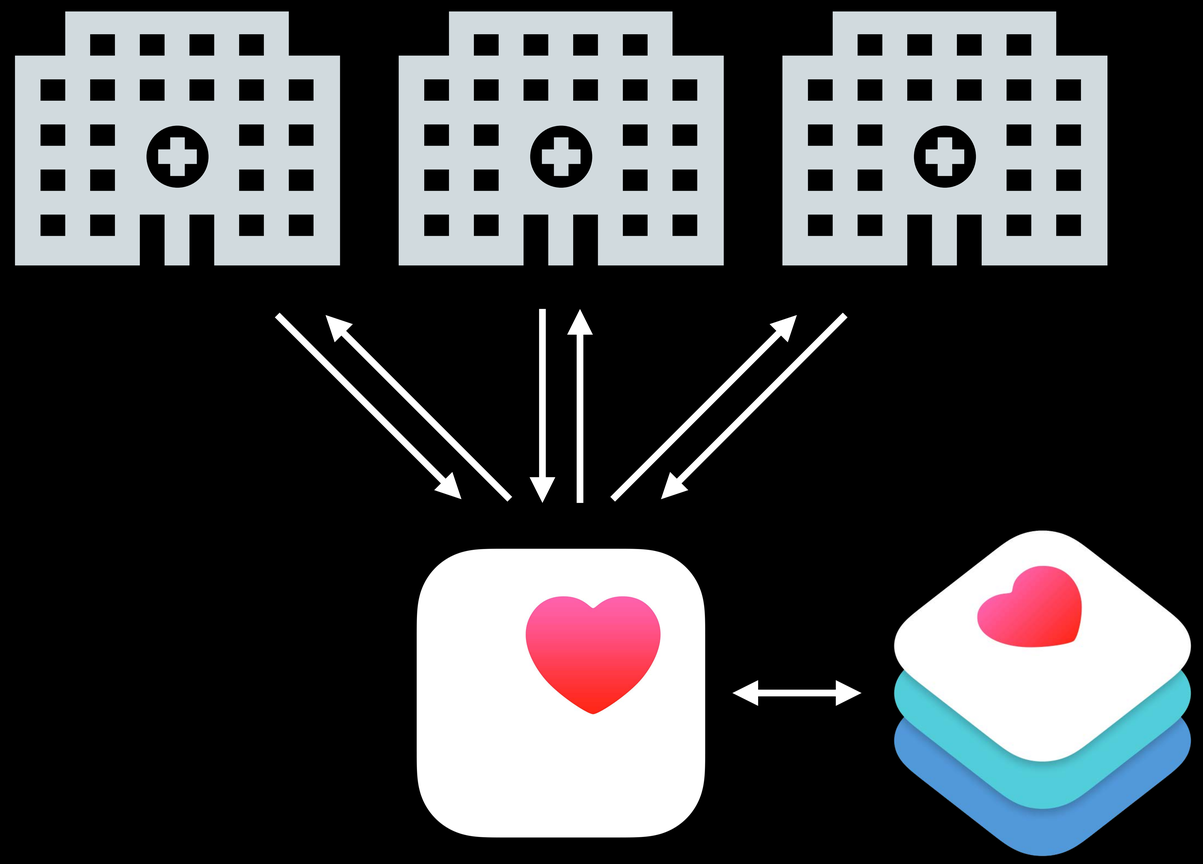


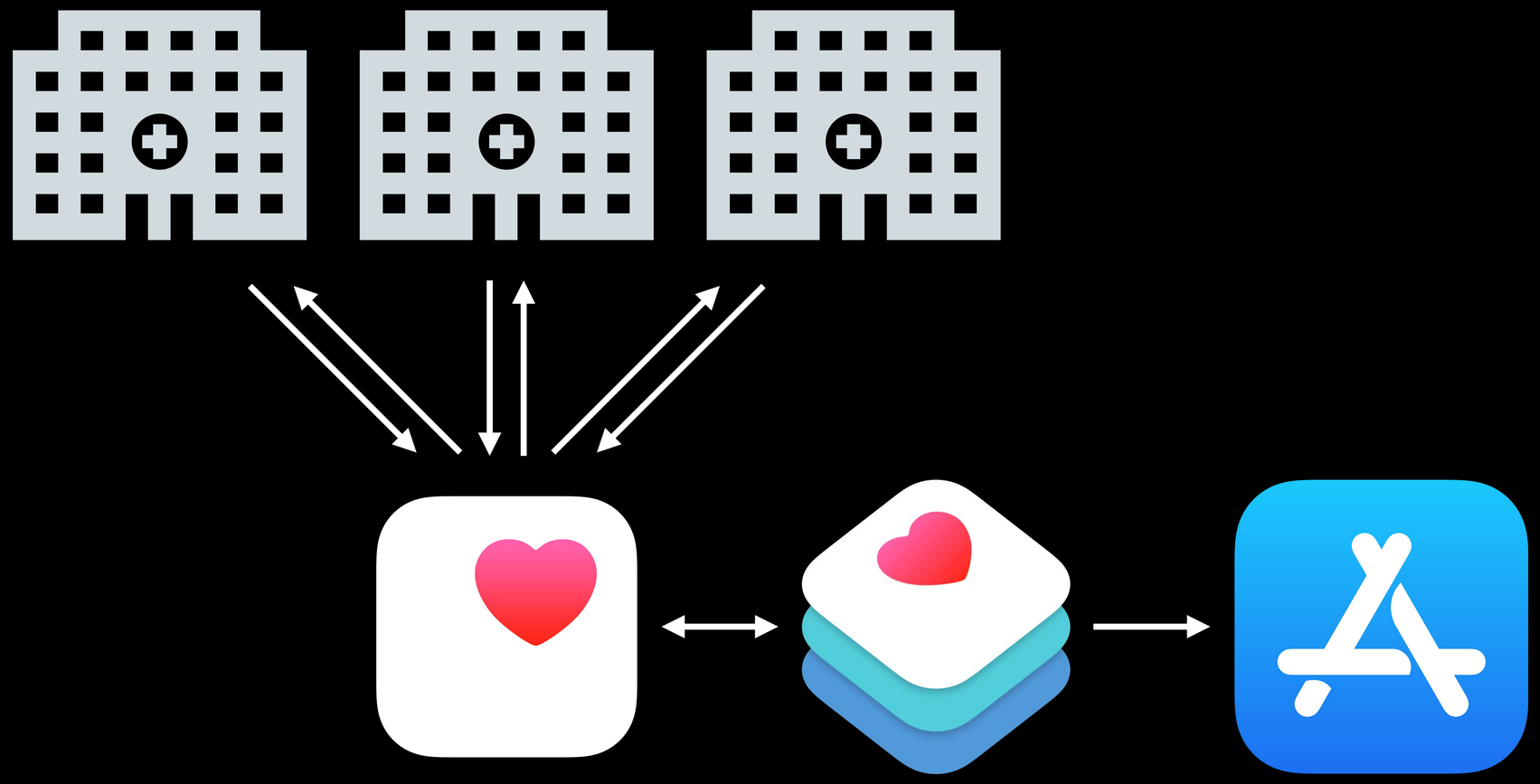








NEW



Agenda

New sample types

Authorization and access

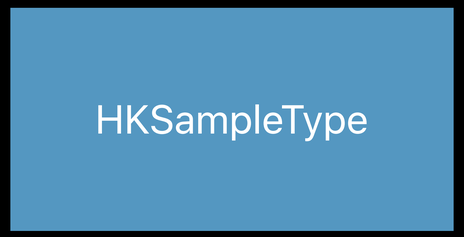
Getting started with FHIR

Protecting user privacy

New Sample Types

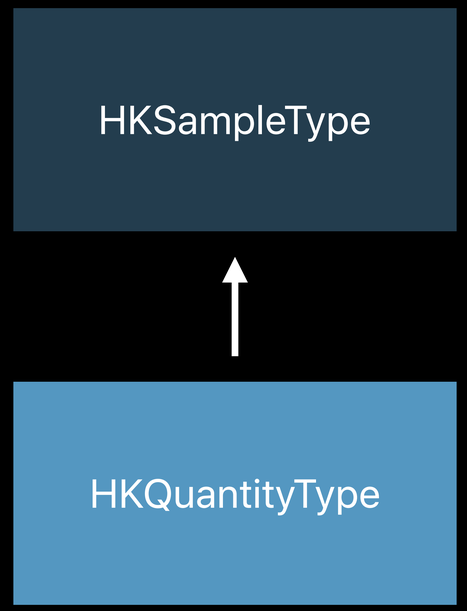
New Sample Types

HKSampleType



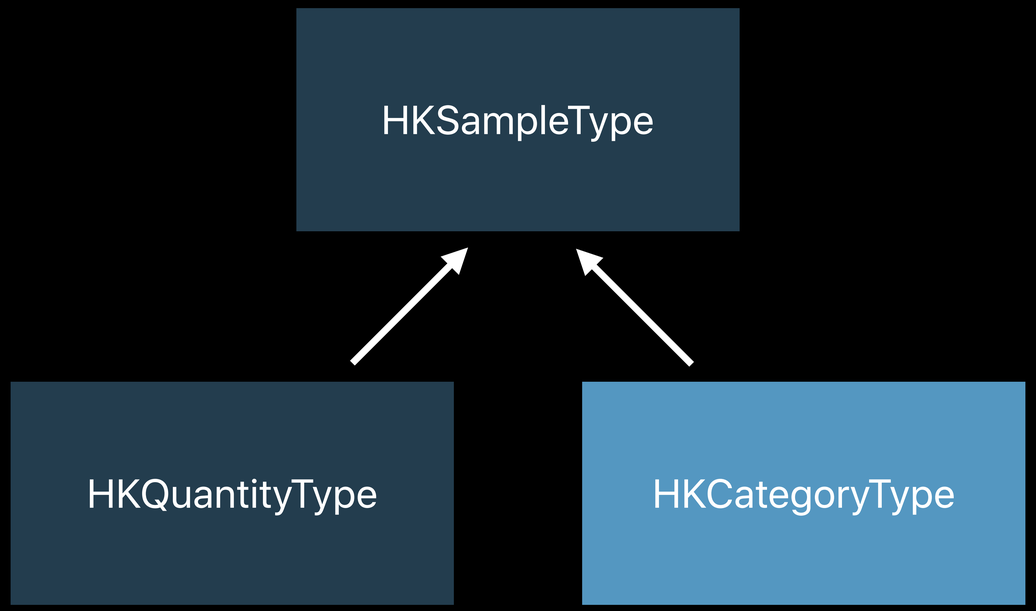
New Sample Types

HKSampleType



New Sample Types

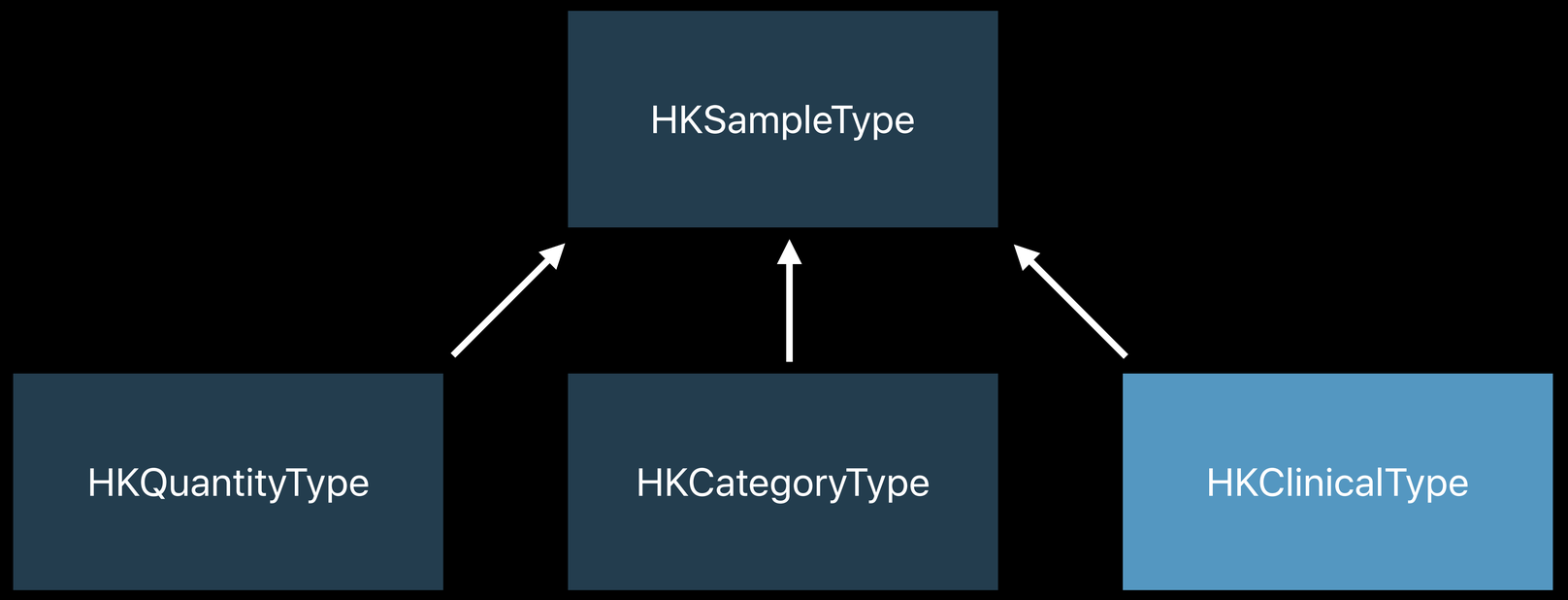
HKSampleType



New Sample Types

HKClinicalType

NEW



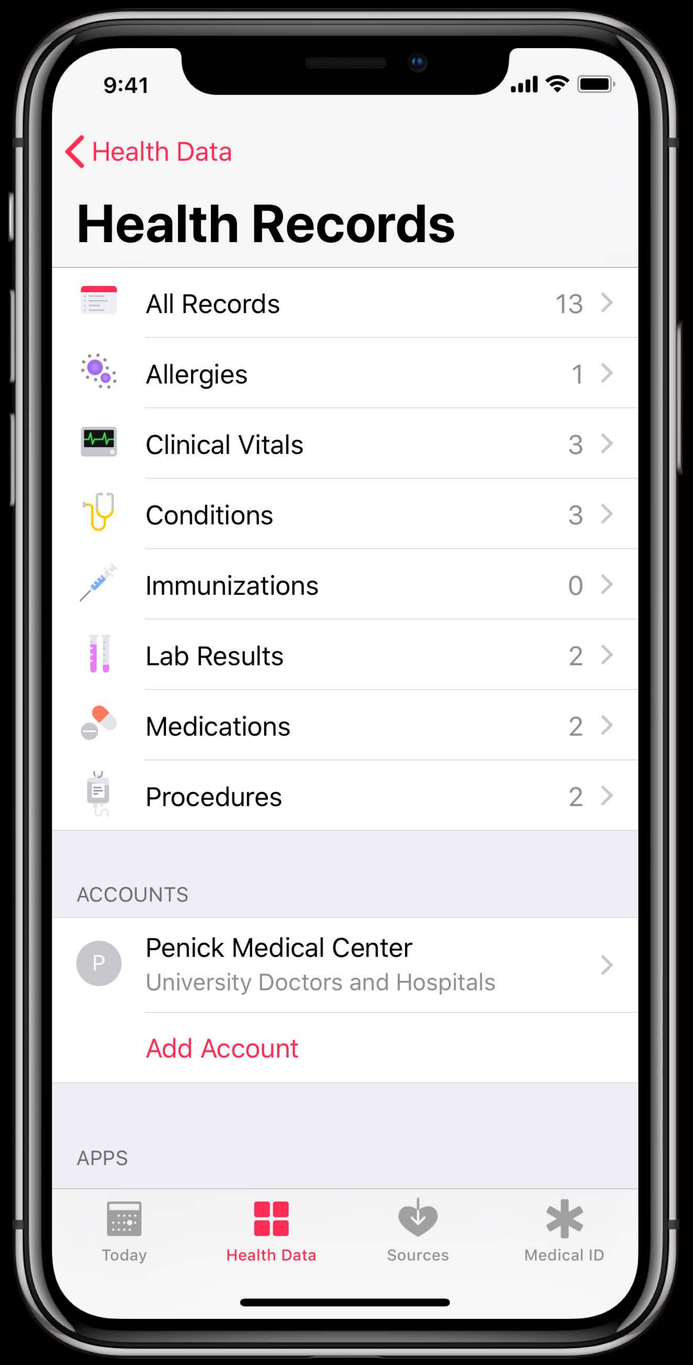
New Sample Types

HKClinicalTypeIdentifier

NEW

New Sample Types

HKClinicalTypeIdentifier



NEW

New Sample Types

HKClinicalTypeIdentifier

Allergies `.allergyRecord`

NEW

New Sample Types

HKClinicalTypeIdentifier

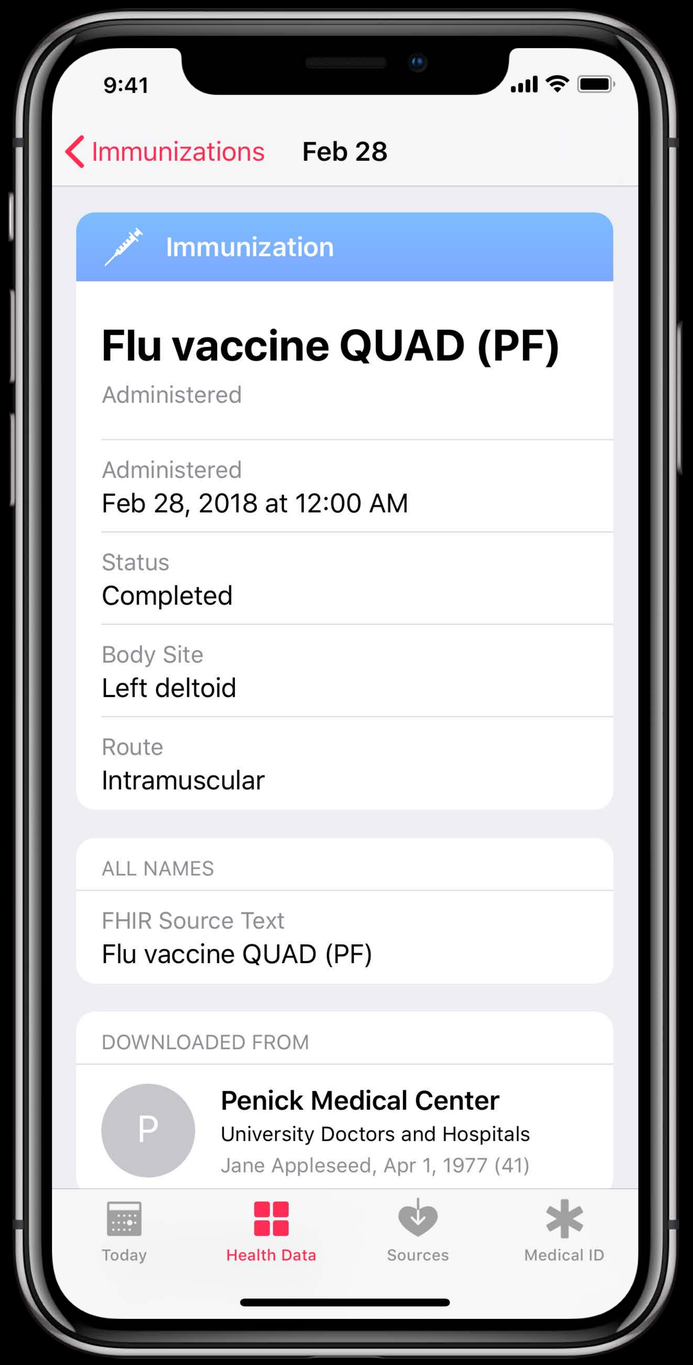
Allergies	`.allergyRecord`
Conditions	`.conditionRecord`

NEW

New Sample Types

HKClinicalTypeIdentifier

Allergies	`.allergyRecord`
Conditions	`.conditionRecord`
Immunizations	`.immunizationRecord`



NEW

New Sample Types

HKClinicalTypeIdentifier

Allergies	`.allergyRecord`
Conditions	`.conditionRecord`
Immunizations	`.immunizationRecord`
Lab Results	`.labResultRecord`

NEW

New Sample Types

HKClinicalTypeIdentifier

Allergies	`.allergyRecord`
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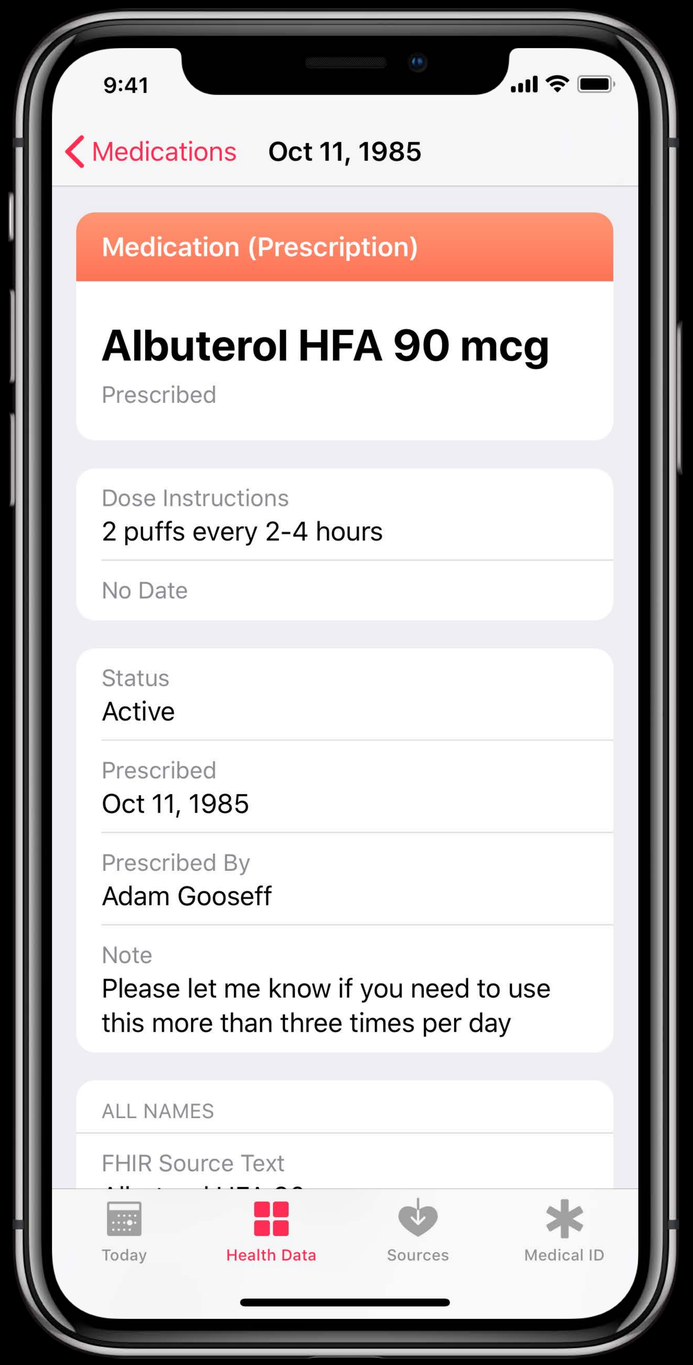
Lab Results	`.labResultRecord`
Medications	`.medicationRecord`



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New Sample Types

HKClinicalTypeIdentifier

Allergies	`.allergyRecord`
Conditions	`.conditionRecord`
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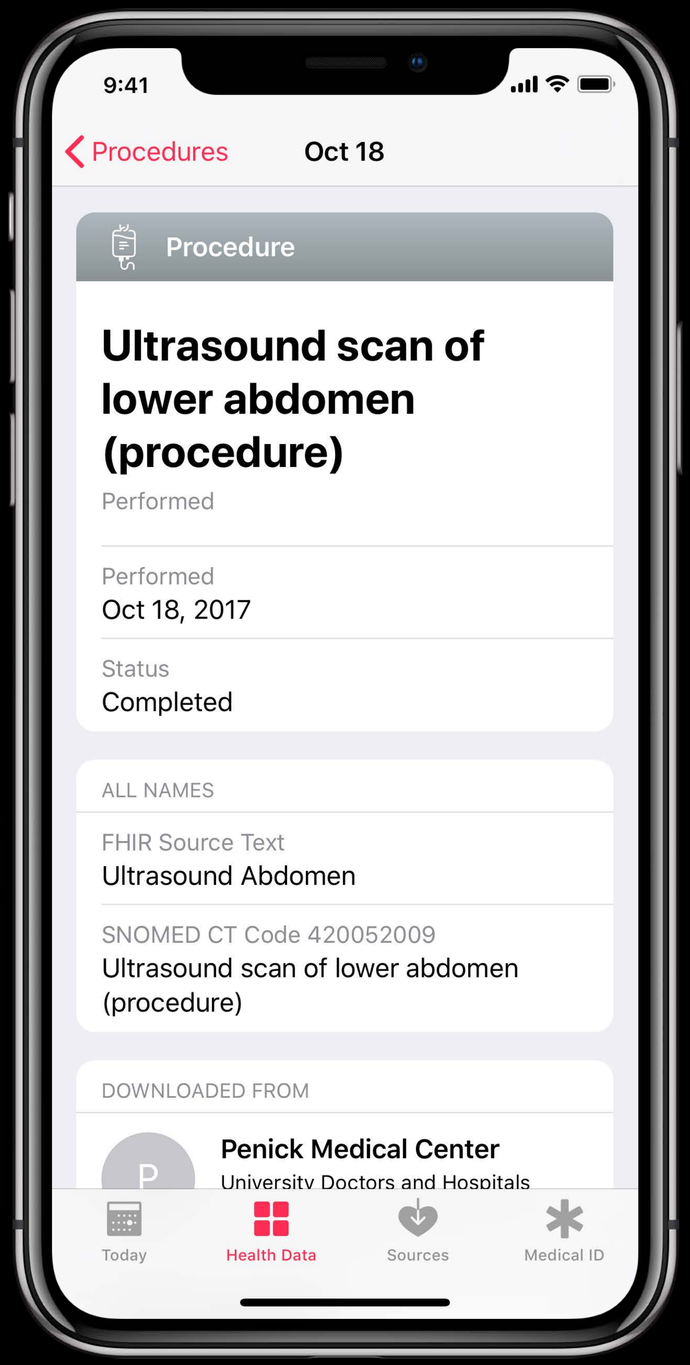
Lab Results	`.labResultRecord`
Medications	`.medicationRecord`
Procedures	`.procedureRecord`



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New Sample Types

HKClinicalTypeIdentifier

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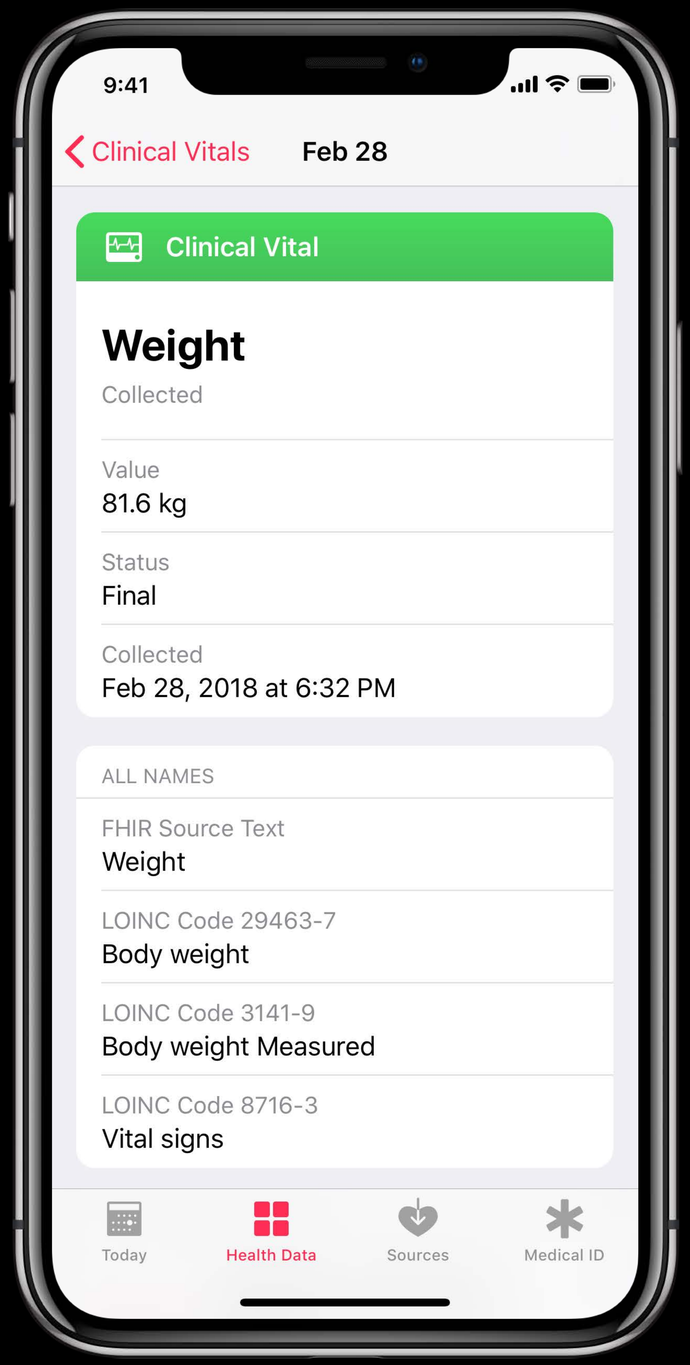
Conditions	`.conditionRecord`
Immunizations	`.immunizationRecord`
Lab Results	`.labResultRecord`
Medications	`.medicationRecord`
Procedures	`.procedureRecord`
Vital Signs	`.vitalSignRecord`



NEW

New Sample Types

HKClinicalRecord

NEW

New Sample Types

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```
class HKClinicalRecord : HKSample {
}
```

New Sample Types

HKClinicalRecord

NEW

```
class HKClinicalRecord : HKSample {

    var clinicalType: HKClinicalType { get }
    var displayName: String { get }
    var fhirResource: HKFHIRResource? { get }

}
```

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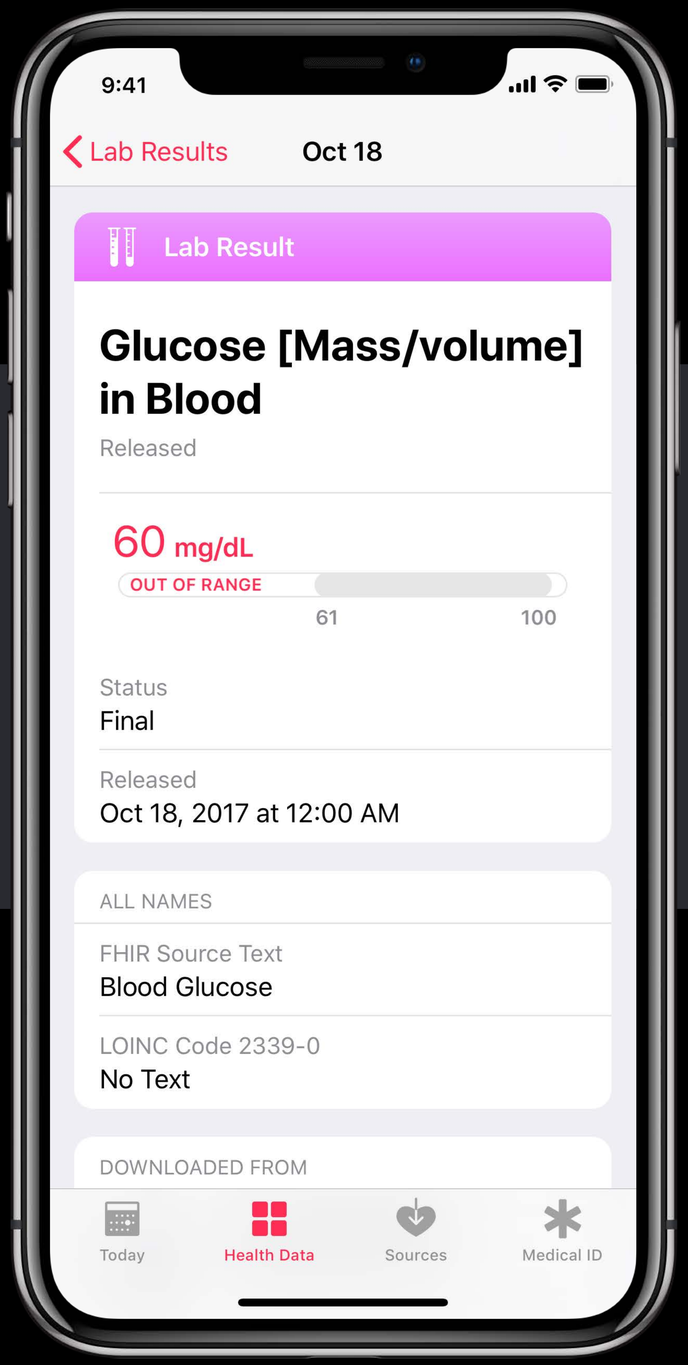

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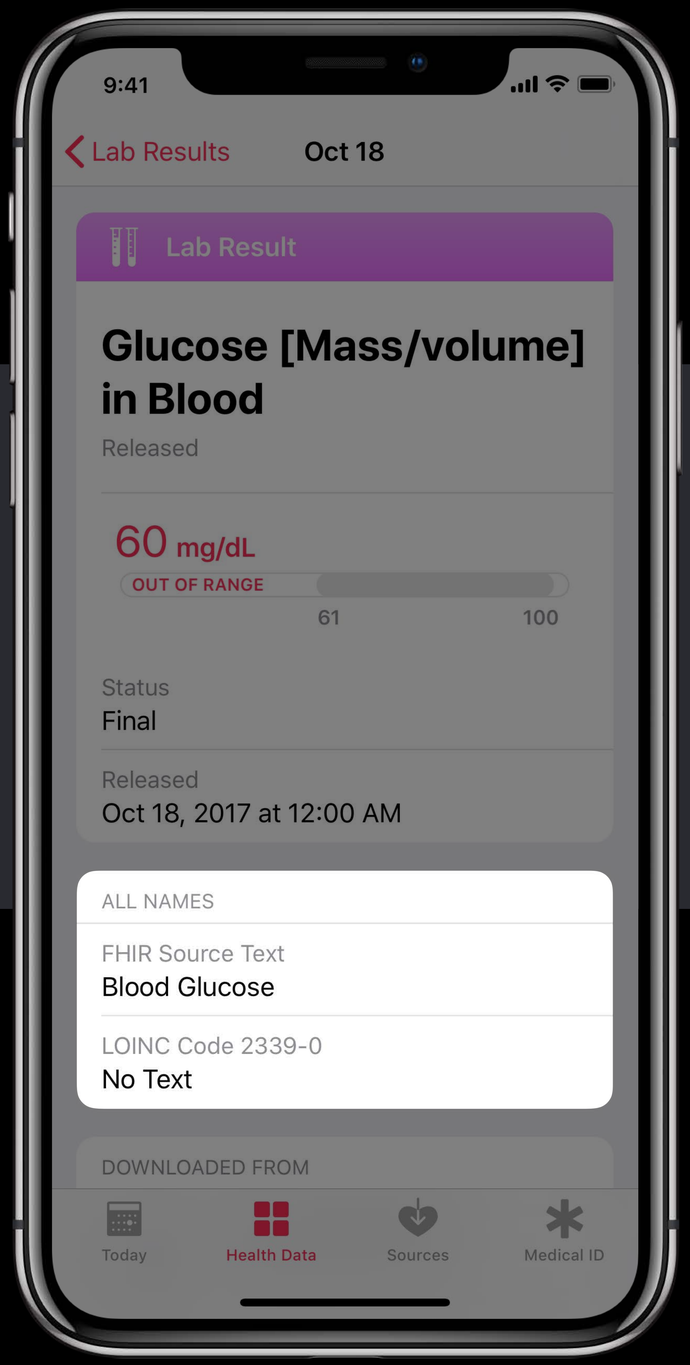

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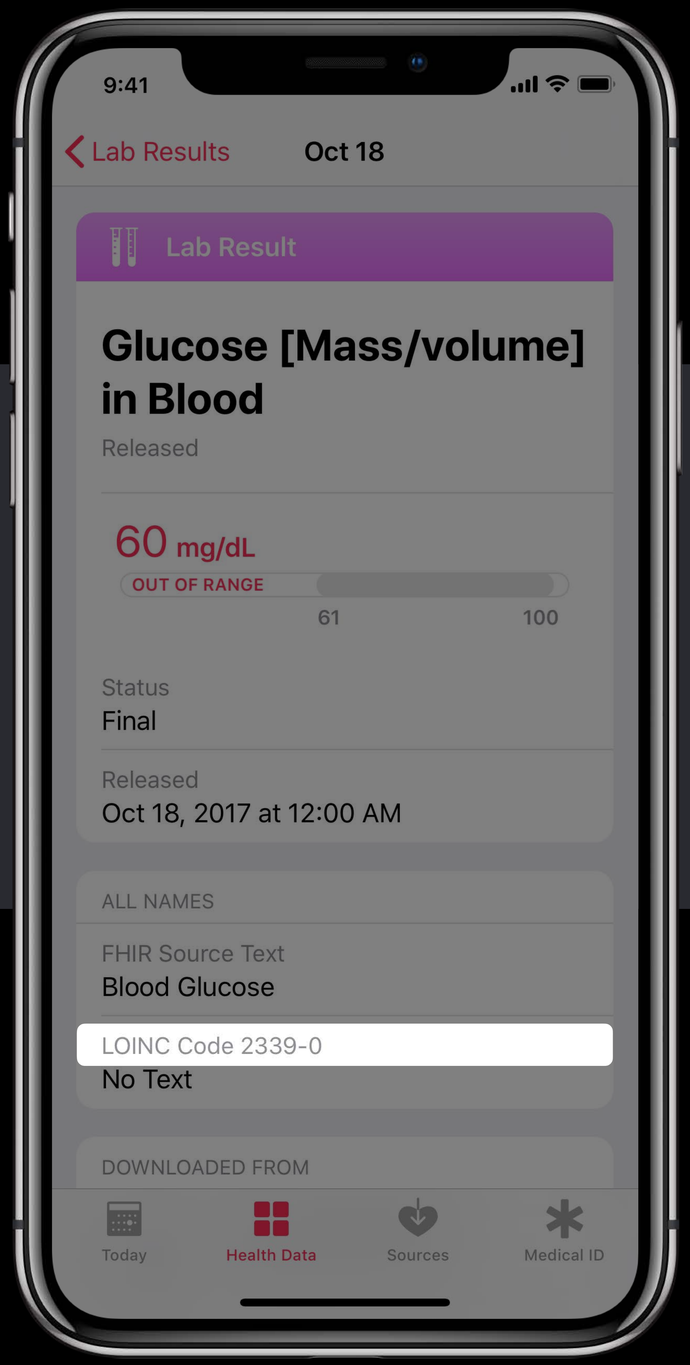

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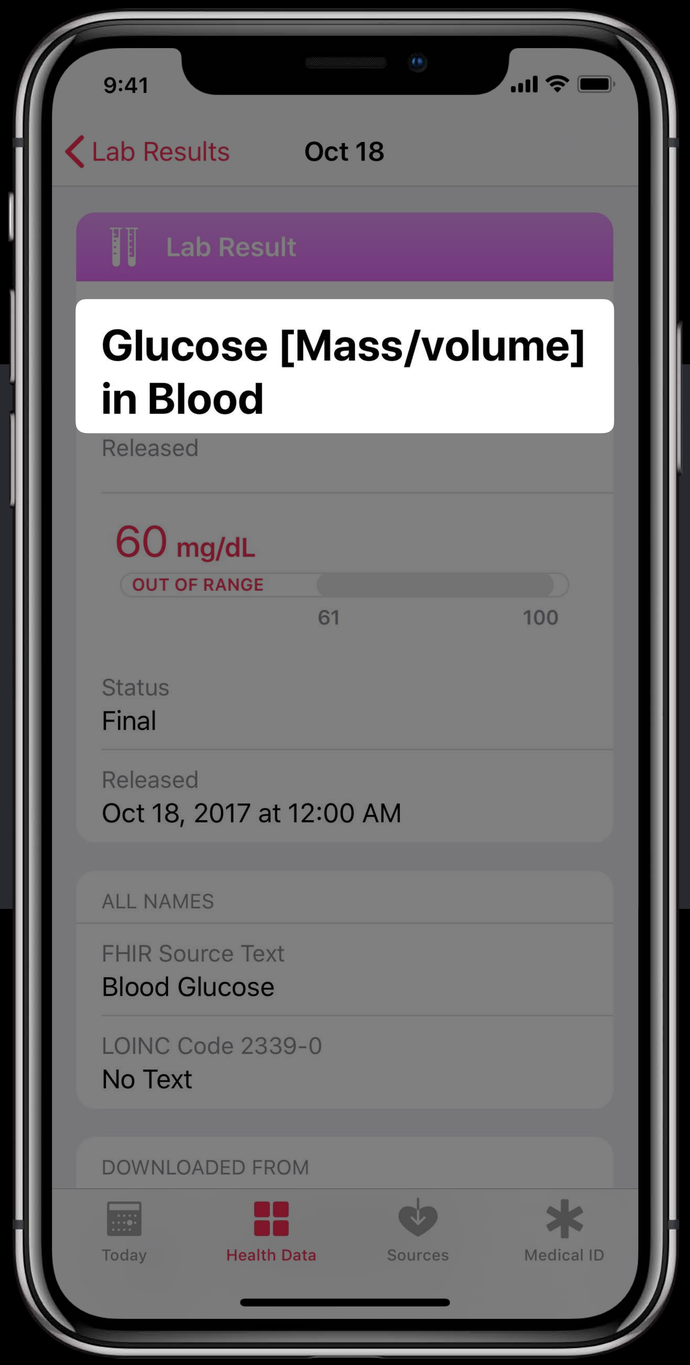

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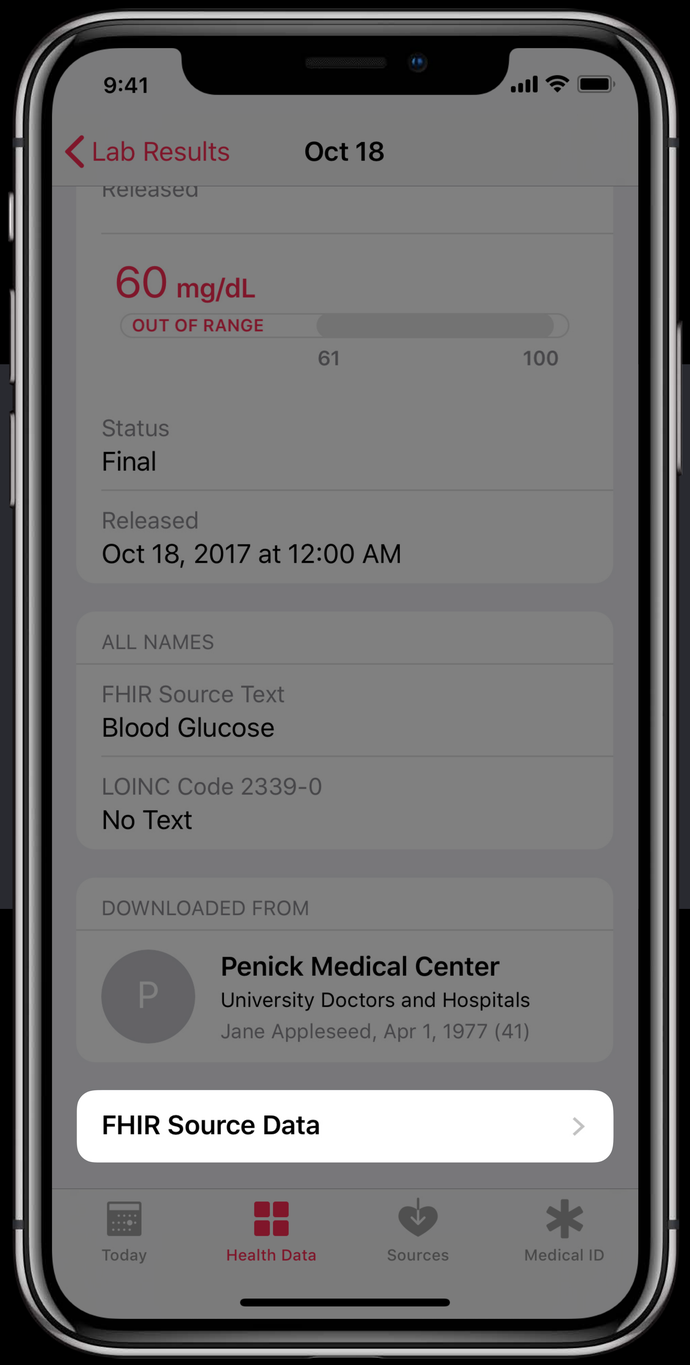

NEW

New Sample Types

Provenance

New Sample Types

Provenance

```
class HKSource : NSObject {
}
```

New Sample Types

Provenance

```
class HKSource : NSObject {

    var name: String { get }
    var bundleIdentifier: String { get }

}
```

New Sample Types

Provenance

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```

Authorization and Access

Authorization and Access

Background

Authorization and Access

Background

Meaningful
Experiences

Authorization and Access

Background

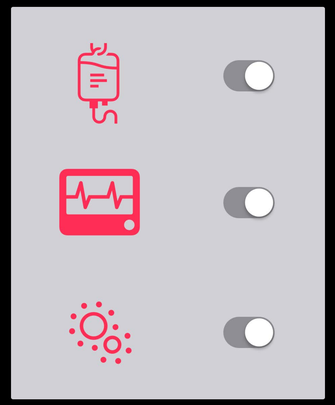
Meaningful Experiences

Sensitive Data

Authorization and Access

Background

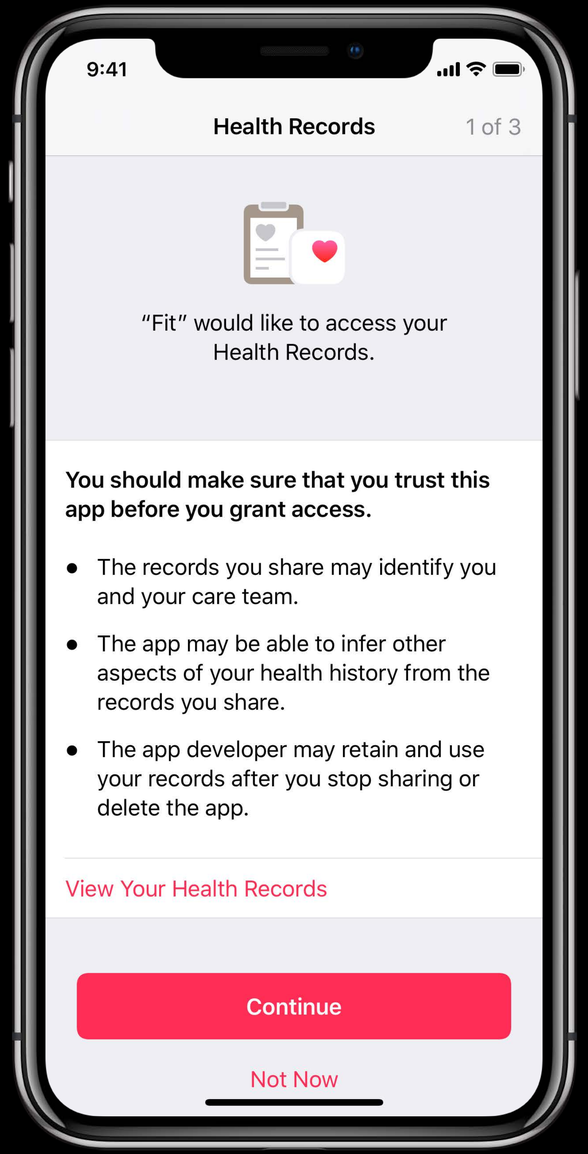
Meaningful Experiences

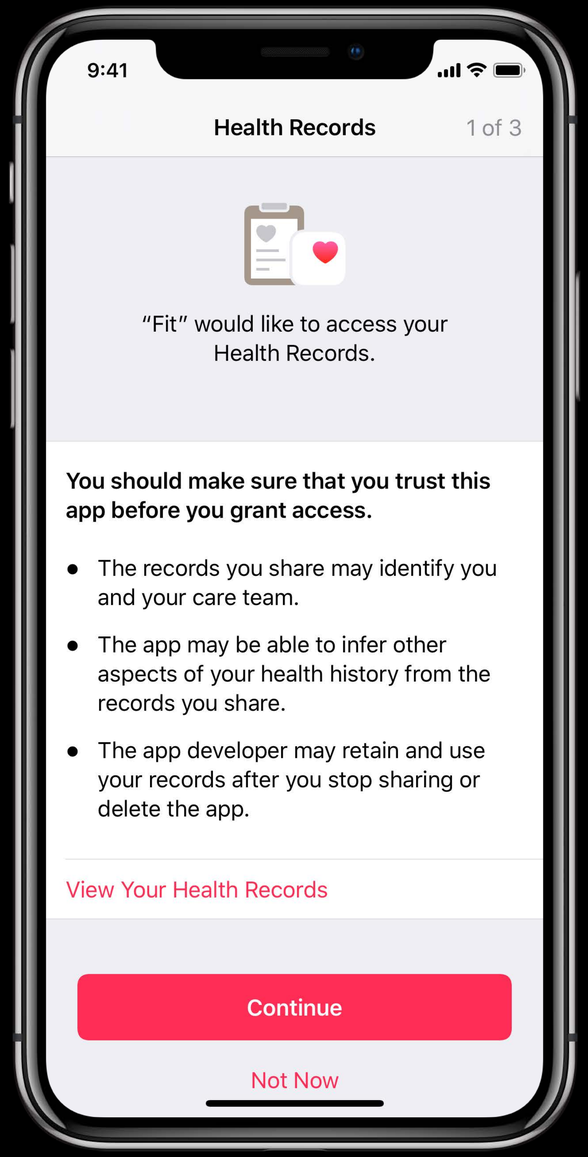


New Authorization

Sensitive Data

NEW


9:41
Health Records
1 of 3
"Fit" would like to access your Health Records.
You should make sure that you trust this app before you grant access.
The records you share may identify you and your care team.
The app may be able to infer other aspects of your health history from the records you share.
The app developer may retain and use your records after you stop sharing or delete the app.
View Your Health Records
Continue
Not Now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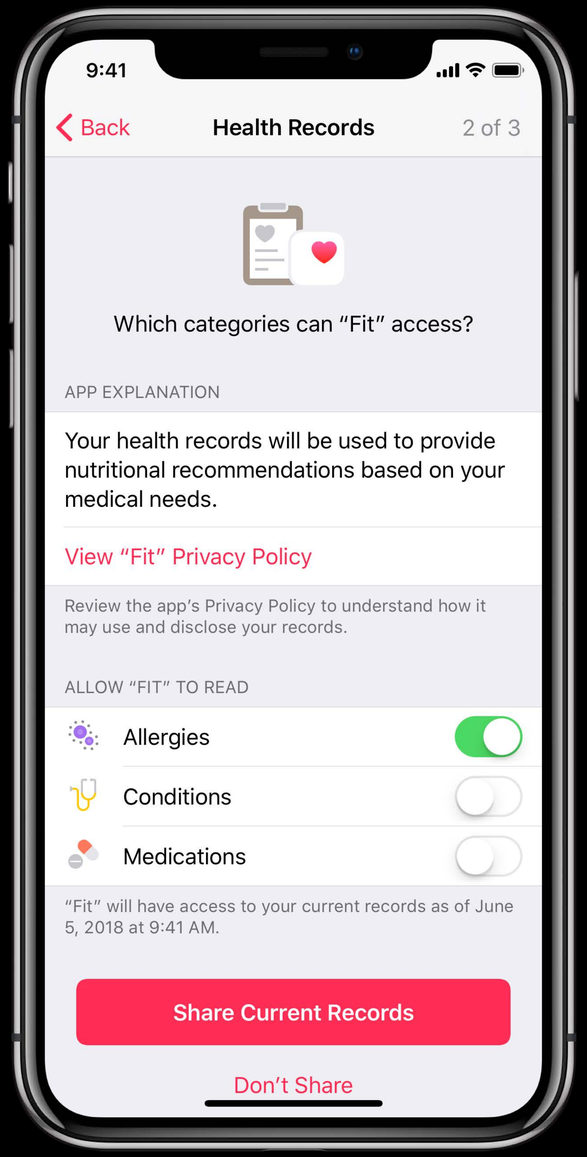
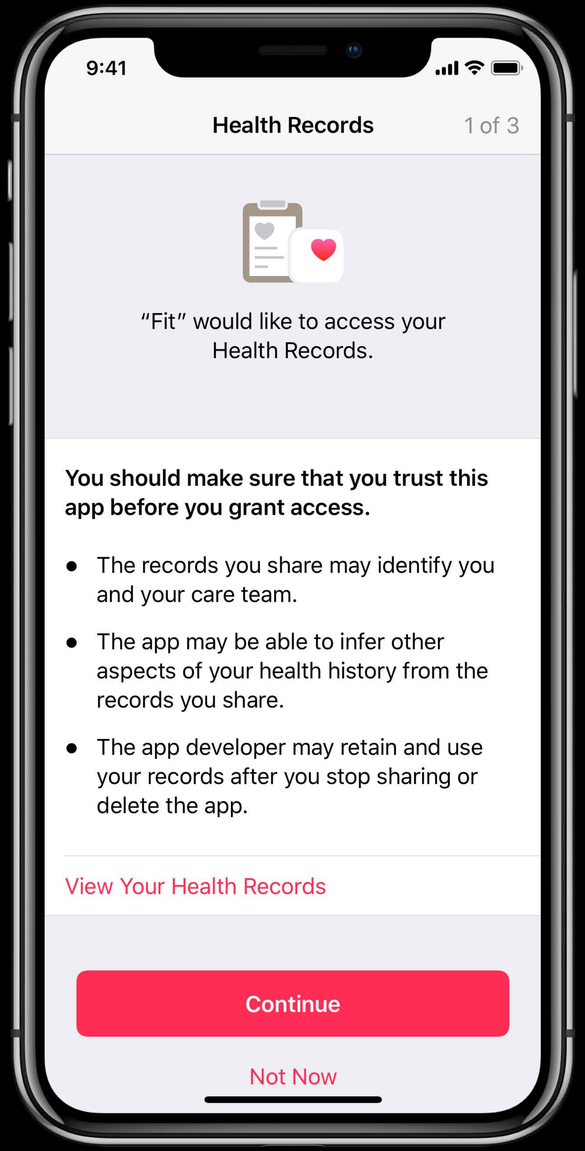

9:41
Back
Health Records
2 of 3
Which categories can "Fit" access?
APP EXPLANATION
Your health records will be used to provide nutritional recommendations based on your medical needs.
View "Fit" Privacy Policy
Review the app's Privacy Policy to understand how it may use and disclose your records.
ALLOW "FIT" TO READ
Allergies
Conditions
Medications
"Fit" will have access to your current records as of June 5, 2018 at 9:41 AM.
Share Current Records
Don't Share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Health Records
1 of 3
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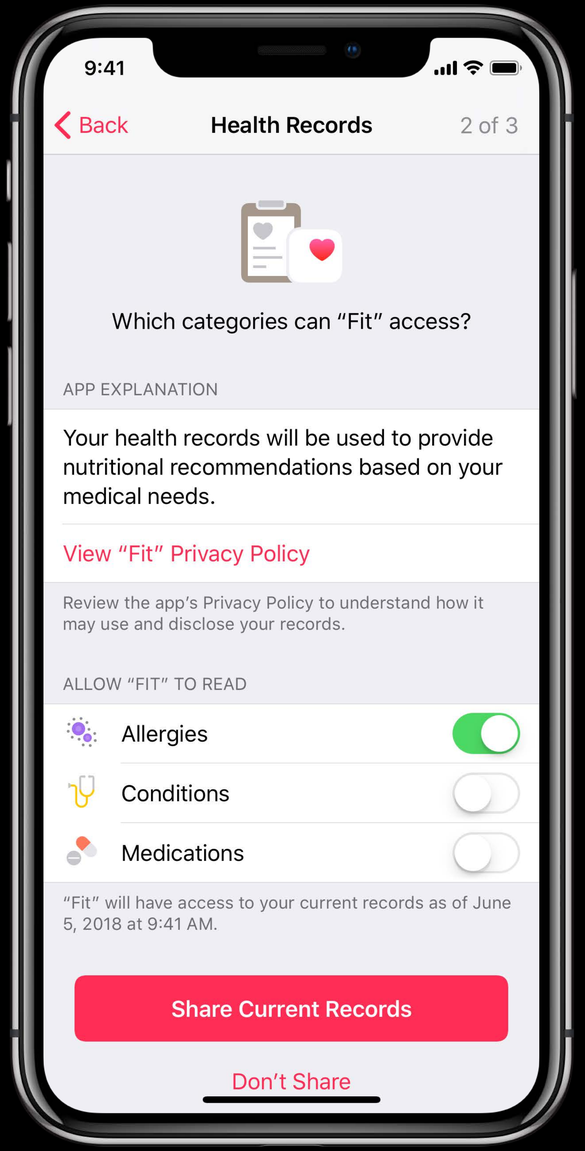
The app developer may retain and use your records after you stop sharing or delete the app.
View Your Health Records
Continue
Not Now


9:41
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Health Records
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Allergies
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"Fit" will have access to your current records as of June 5, 2018 at 9:41 AM.
Share Current Records
Don't Share

9:41
Back
Health Records
3 of 3
How would you like to share new records?
SHARING NEW RECORDS
Ask Before Sharing
Automatically Share
"Fit" will have access to your current records as of June 5, 2018 at 9:41 AM and will ask each time before accessing new records.
Done

Authorization and Access

Authorization and Access

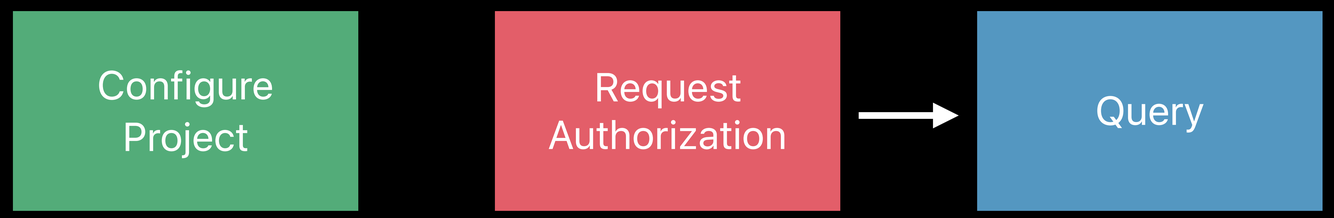
Configure
Project

Authorization and Access

Configure Project

Request Authorization

Authorization and Access



Authorization and Access

Configure project

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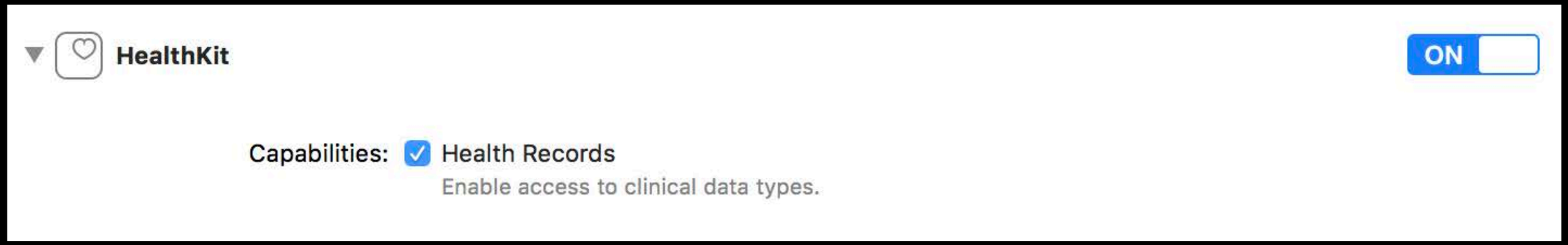
Add “Health Records” capability in Xcode

Authorization and Access

Configure project

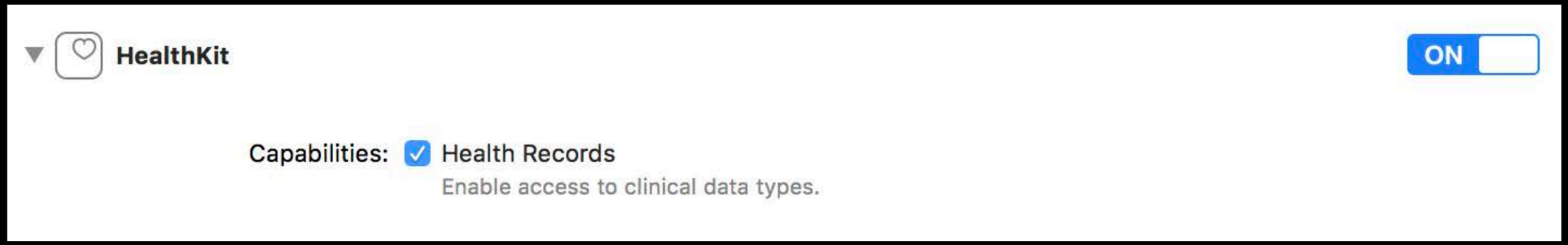
Add “Health Records” capability in Xcode



Authorization and Access

Configure project

Add “Health Records” capability in Xcode

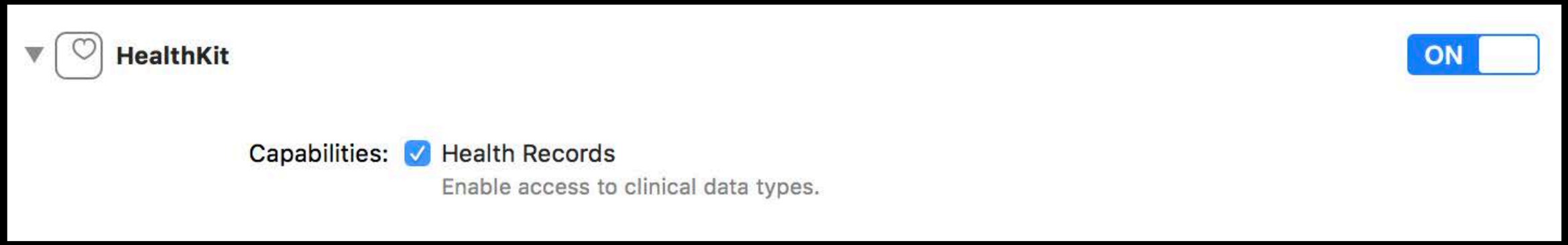


Add “Privacy – Health Records Usage Description” purpose string to your Info.plist

Authorization and Access

Configure project

Add “Health Records” capability in Xcode



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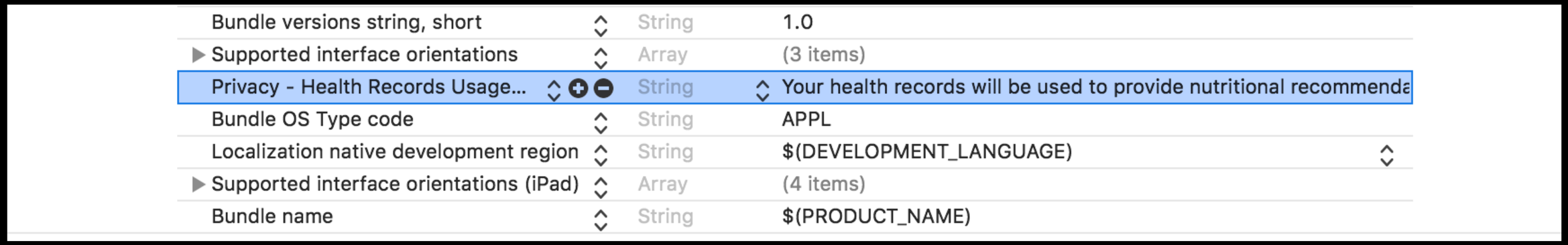

Bundle versions string, short	String	1.0
Supported interface orientations	Array	(3 items)
Privacy - Health Records Usage...	String	Your health records will be used to provide nutritional recommenda
Bundle OS Type code	String	APPL
Localization native development region	String	$(DEVELOPMENT_LANGUAGE)
Supported interface orientations (iPad)	Array	(4 items)
Bundle name	String	$(PRODUCT_NAME)

Authorization and Access

Request authorization

Authorization and Access

Request authorization

```
let conditions = HKObjectType.clinicalType(forIdentifier: .conditionRecord)!
```

Authorization and Access

Request authorization

```
let conditions = HKObjectType.clinicalType(forIdentifier: .conditionRecord)!
let immunizations = HKObjectType.clinicalType(forIdentifier: .immunizationRecord)!
```

Authorization and Access

Request authorization

```
let conditions = HKObjectType.clinicalType(forIdentifier: .conditionRecord)!
let immunizations = HKObjectType.clinicalType(forIdentifier: .immunizationRecord)!
let medications = HKObjectType.clinicalType(forIdentifier: .medicationRecord)!
```

Authorization and Access

Request authorization

```
let conditions = HKObjectType.clinicalType(forIdentifier: .conditionRecord)!
let immunizations = HKObjectType.clinicalType(forIdentifier: .immunizationRecord)!
let medications = HKObjectType.clinicalType(forIdentifier: .medicationRecord)!
let types = Set([conditions, immunizations, medications])
```

Authorization and Access

Request authorization

```
let conditions = HKObjectType.clinicalType(forIdentifier: .conditionRecord)!
let immunizations = HKObjectType.clinicalType(forIdentifier: .immunizationRecord)!
let medications = HKObjectType.clinicalType(forIdentifier: .medicationRecord)!
let types = Set([conditions, immunizations, medications])

store.requestAuthorization(toShare: Set(), read: types) { (success, error) in
}
```

Authorization and Access

Request authorization

```
let conditions = HKObjectType.clinicalType(forIdentifier: .conditionRecord)!
let immunizations = HKObjectType.clinicalType(forIdentifier: .immunizationRecord)!
let medications = HKObjectType.clinicalType(forIdentifier: .medicationRecord)!
let types = Set([conditions, immunizations, medications])

store.requestAuthorization(toShare: Set(), read: types) { (success, error) in
    guard success else {
        // Handle error
        return
    }
}
```

Authorization and Access

Request authorization

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let conditions = HKObjectType.clinicalType(forIdentifier: .conditionRecord)!
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let types = Set([conditions, immunizations, medications])

store.requestAuthorization(toShare: Set(), read: types) { (success, error) in
    guard success else {
        // Handle error
        return
    }
    // Query for records
}
```

Authorization and Access

Query

Query using existing HealthKit queries

- `HKSampleQuery`, `HKAnchoredObjectQuery`, `HKObserverQuery`, ...

Authorization and Access

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```
let medicationsType = HKObjectType.clinicalType(forIdentifier: .medicationRecord)!
```

Authorization and Access

Query

Query using existing HealthKit queries

- `HKSampleQuery`, `HKAnchoredObjectQuery`, `HKObserverQuery`, ...

```
let medicationsType = HKObjectType.clinicalType(forIdentifier: .medicationRecord)!
let query = HKSampleQuery(sampleType: medicationsType,
                          predicate: nil,
                          limit: HKObjectQueryNoLimit,
                          sortDescriptors: []) { (query, samples, error) in
                            // Handle results
}
```

Authorization and Access

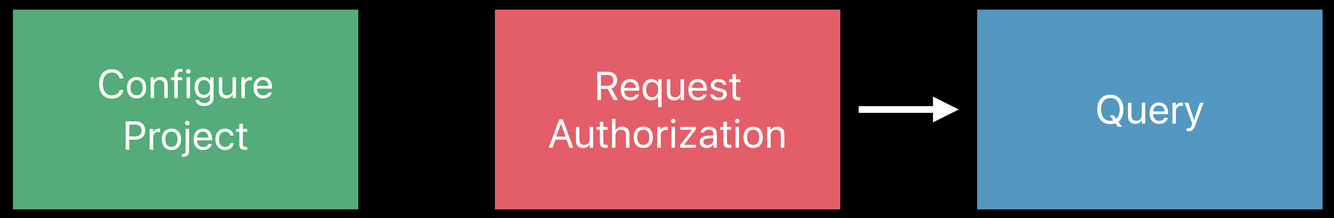
Query

Query using existing HealthKit queries

- `HKSampleQuery`, `HKAnchoredObjectQuery`, `HKObserverQuery`, ...

```
let medicationsType = HKObjectType.clinicalType(forIdentifier: .medicationRecord)!
let query = HKSampleQuery(sampleType: medicationsType,
                          predicate: nil,
                          limit: HKObjectQueryNoLimit,
                          sortDescriptors: []) { (query, samples, error) in
                            // Handle results
}
store.executeQuery(query)
```

Authorization and Access

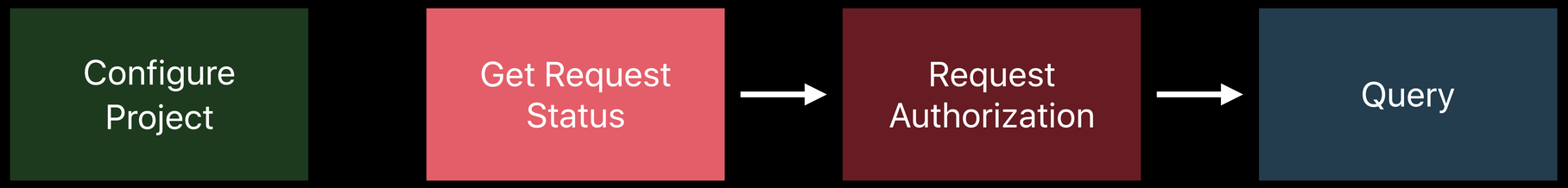


Authorization and Access

Controlling timing

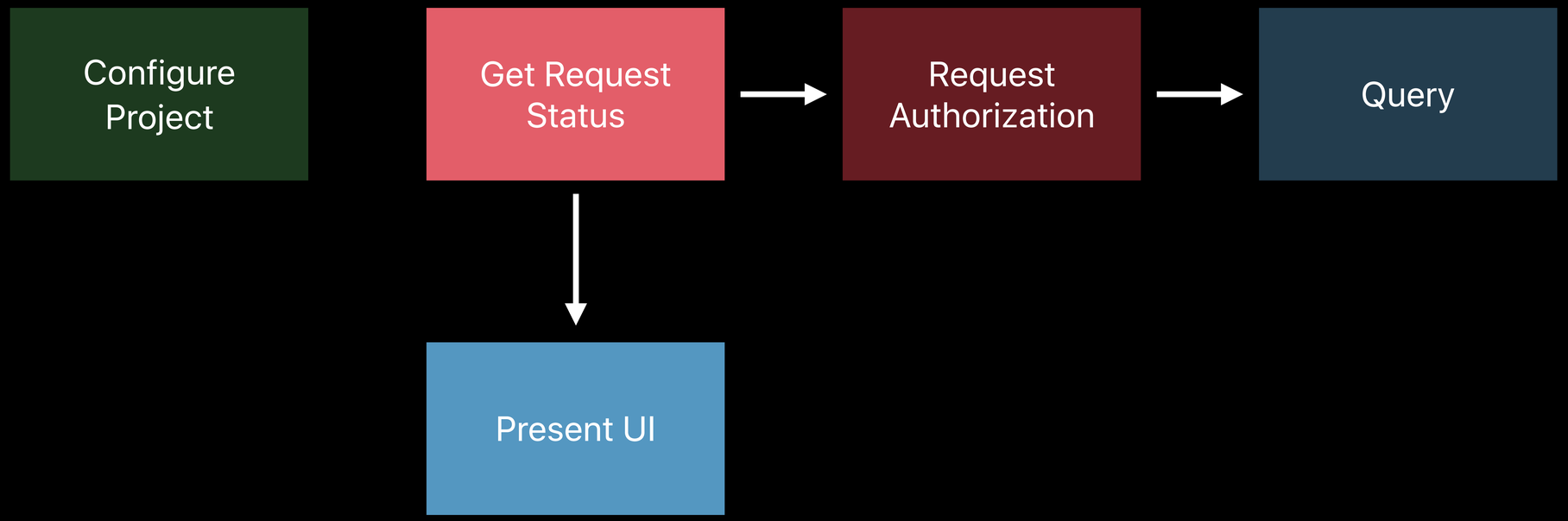
Authorization and Access

Controlling timing



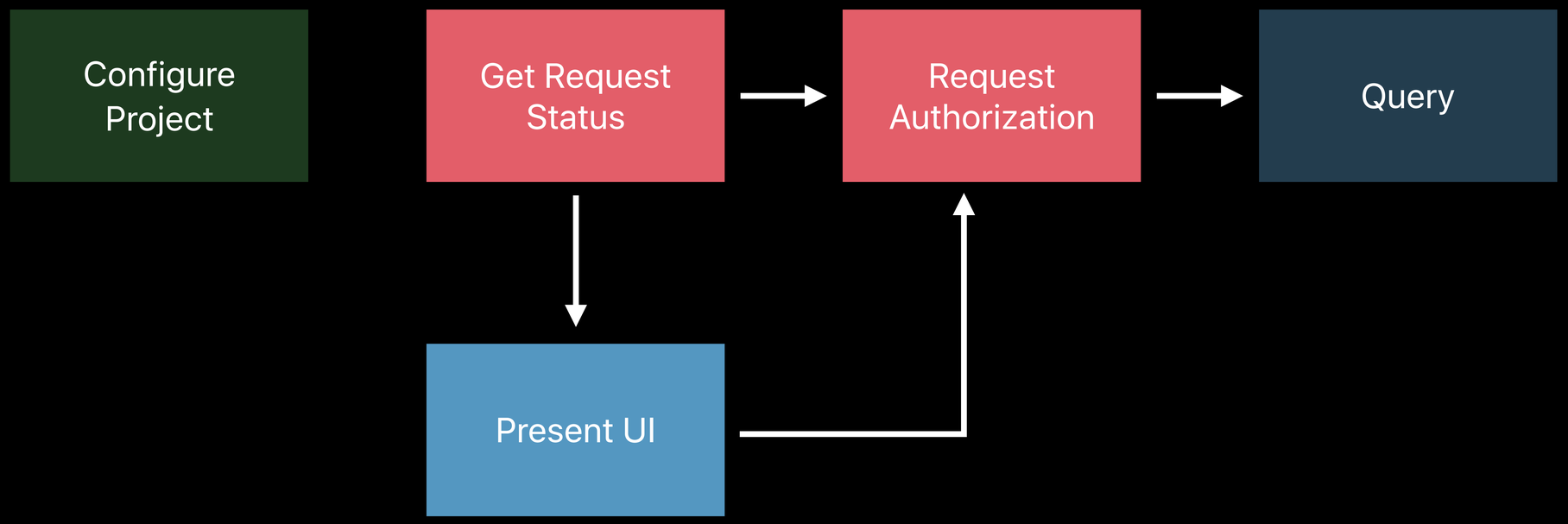
Authorization and Access

Controlling timing



Authorization and Access

Controlling timing



Authorization and Access

Controlling timing

NEW

```
store.getRequestStatusForAuthorization(toShare: Set(), read: types {
    (requestStatus, error) in
}
```

Authorization and Access

Controlling timing

NEW

```
store.getRequestStatusForAuthorization(toShare: Set(), read: types {
    (requestStatus, error) in
    guard requestStatus != .unknown else {
        // Handle error
        return
    }
}
```

Authorization and Access

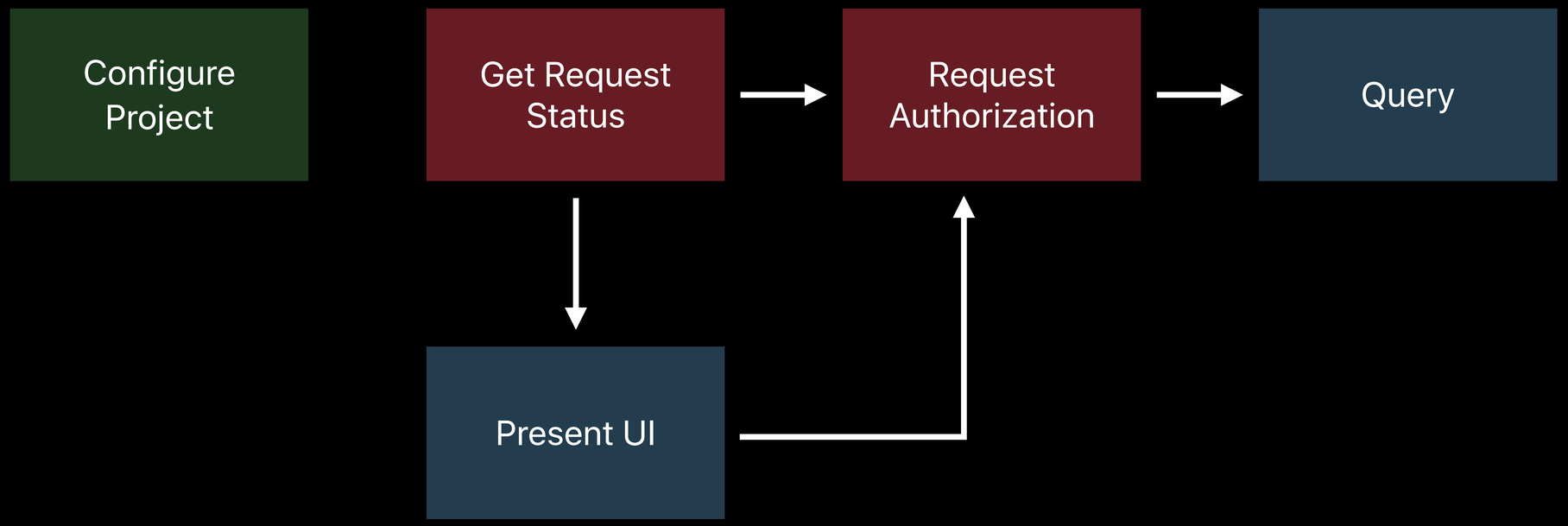
Controlling timing

NEW

```
store.getRequestStatusForAuthorization(toShare: Set(), read: types {
    (requestStatus, error) in
    guard requestStatus != .unknown else {
        // Handle error
        return
    }
    if requestStatus == .shouldRequest {
        // Present UI
    }
}
```

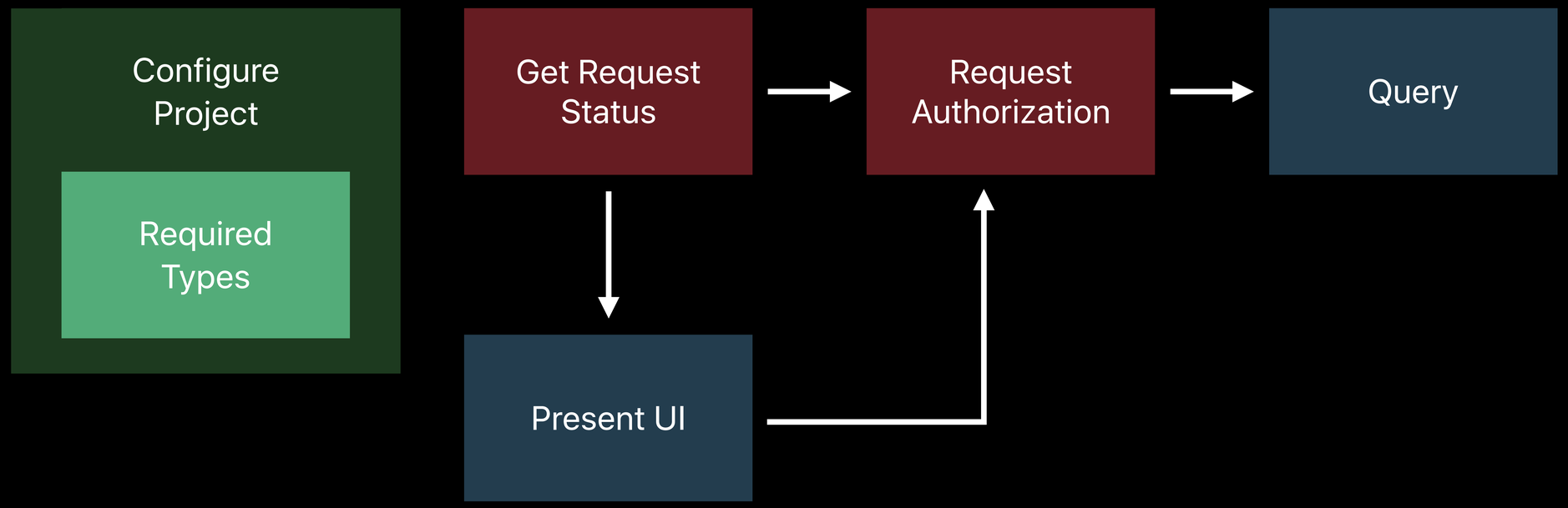
Authorization and Access

Required types



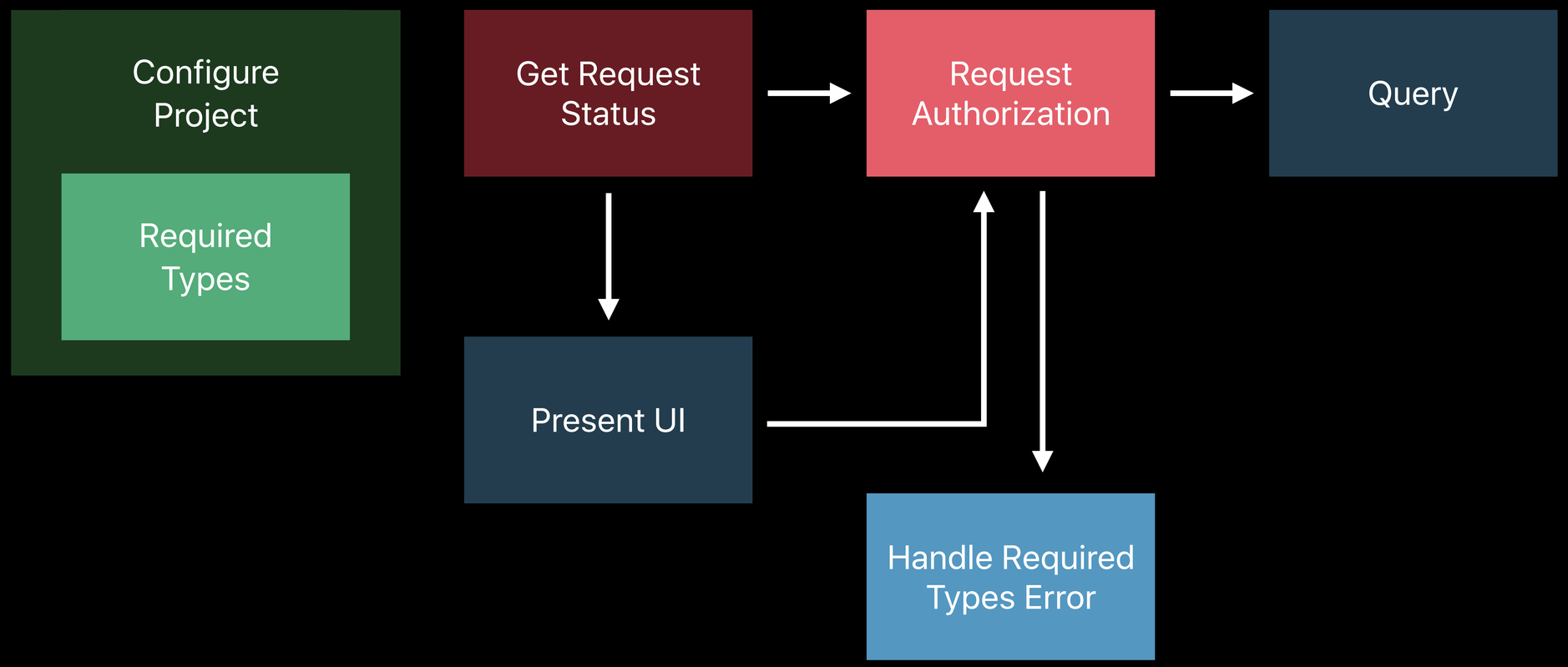
Authorization and Access

Required types



Authorization and Access

Required types



Authorization and Access

Required types

NEW

Authorization and Access

Required types

NEW

Add `NSHealthRequiredReadAuthorizationTypeIdentifiers` Info.plist key

Authorization and Access

Required types

NEW

Add `NSHealthRequiredReadAuthorizationTypeIdentifiers` Info.plist key

```
<key>NSHealthRequiredReadAuthorizationTypeIdentifiers</key>
<array>
    <string>HKClinicalRecordTypeAllergy</string>
    <string>HKClinicalRecordTypeCondition</string>
    <string>HKClinicalRecordTypeImmunization</string>
</array>
```

Authorization and Access

Required types

NEW

Add `NSHealthRequiredReadAuthorizationTypeIdentifiers` Info.plist key

```
<key>NSHealthRequiredReadAuthorizationTypeIdentifiers</key>
<array>
    <string>HKClinicalRecordTypeAllergy</string>
    <string>HKClinicalRecordTypeCondition</string>
    <string>HKClinicalRecordTypeImmunization</string>
</array>
```

Handle `HKError.errorRequiredAuthorizationDenied`

Authorization and Access

Required types

NEW

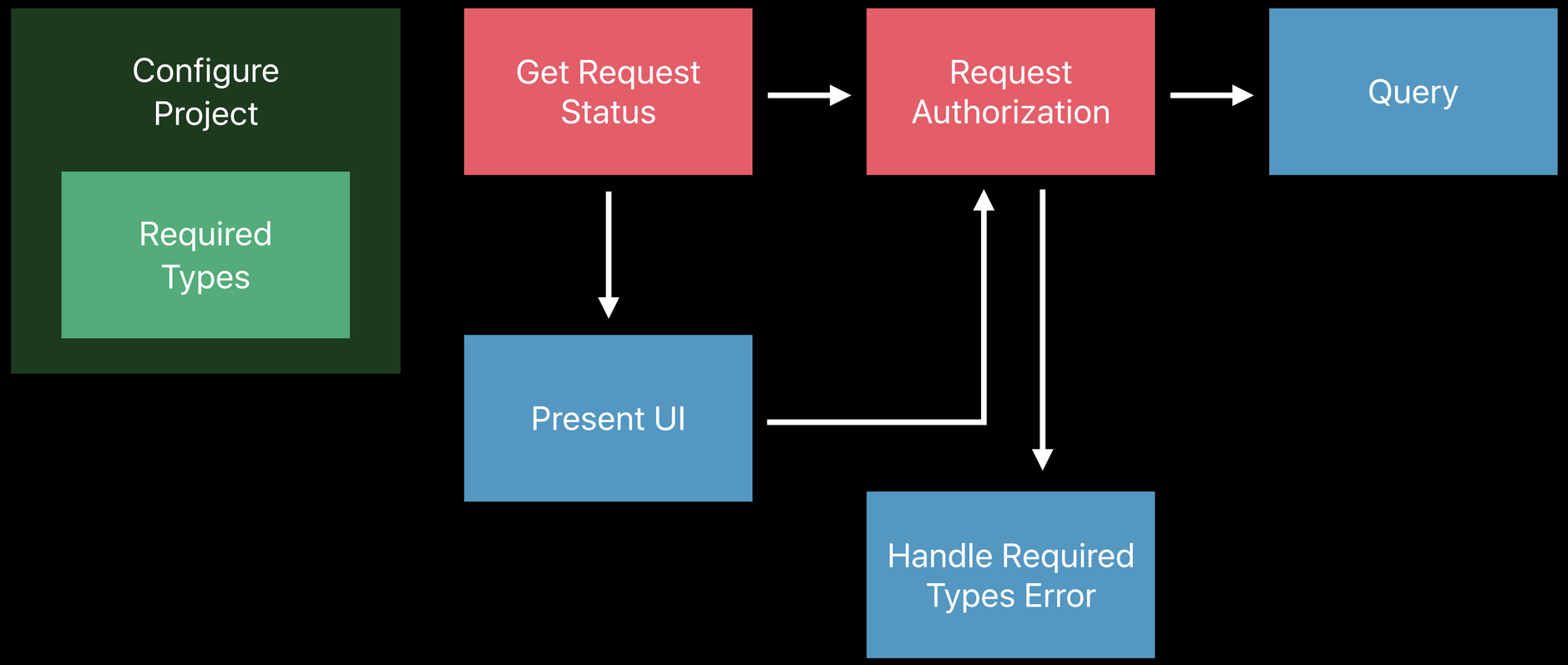
Add `NSHealthRequiredReadAuthorizationTypeIdentifiers` Info.plist key

```
<key>NSHealthRequiredReadAuthorizationTypeIdentifiers</key>
<array>
    <string>HKClinicalRecordTypeAllergy</string>
    <string>HKClinicalRecordTypeCondition</string>
    <string>HKClinicalRecordTypeImmunization</string>
</array>
```

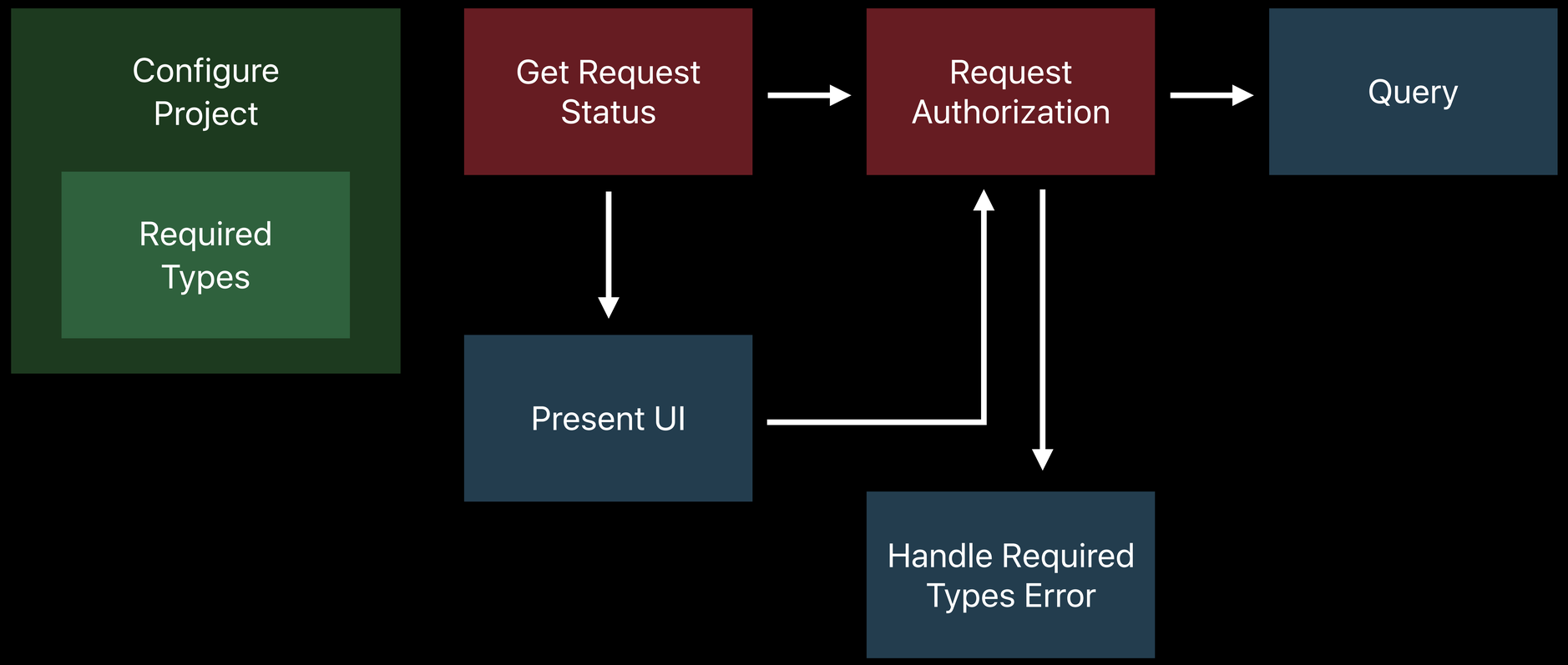
Handle `HKError.errorRequiredAuthorizationDenied`

Use only if absolutely necessary

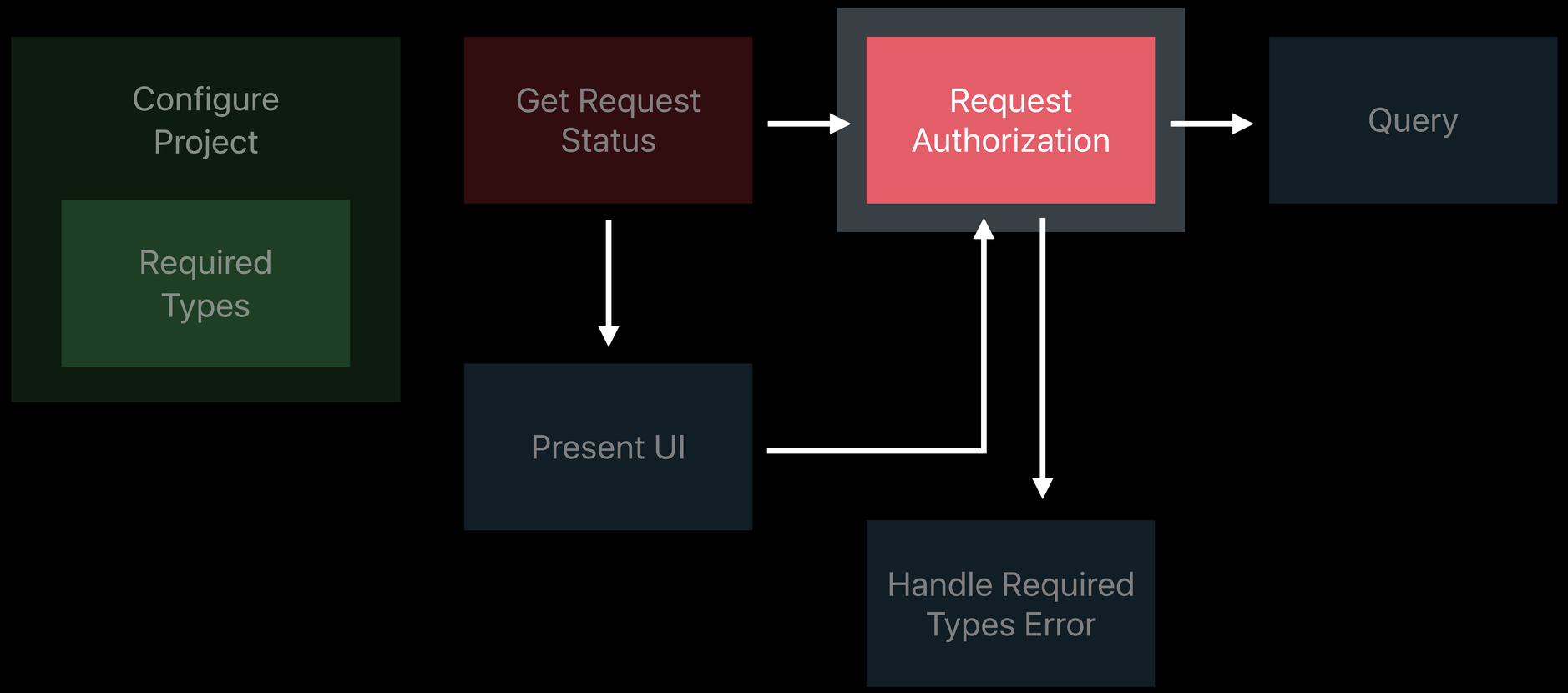
Authorization and Access



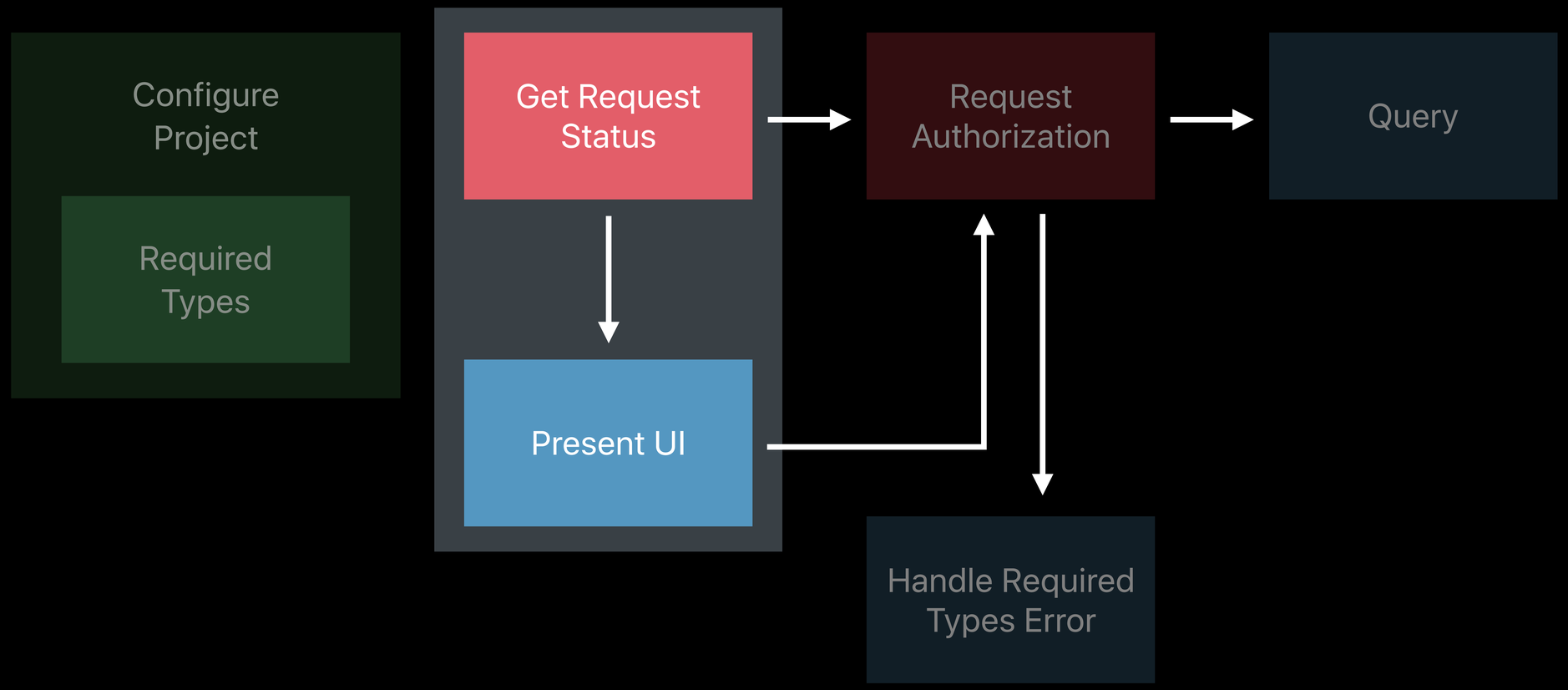
Authorization and Access



Authorization and Access



Authorization and Access



Demo

Authorization and Access

Getting Started with FHIR

Getting Started with FHIR

Interoperability

Multiple Institutions

Different Electronic Health Record systems

Interoperability is a challenge

The Argonaut Project

AllergyIntolerance
Appointment
AppointmentResponse
AuditEvent
Basic
Binary
BodySite
Bundle
CarePlan
Claim
ClaimResponse
ClinicalImpression
Communication
CommunicationRequest
Composition
ConceptMap
Condition
Conformance
Contract
Coverage
DataElement
DetectedIssue
Device
DeviceComponent
DeviceMetric
DeviceUseRequest
DeviceUseStatement
DiagnosticOrder
DiagnosticReport
DocumentManifest
DocumentReference
EligibilityRequest
EligibilityResponse
Encounter
EnrollmentRequest
EnrollmentResponse
EpisodeOfCare
ExplanationOfBenefit
FamilyMemberHistory
Flag
Goal
Group
HealthcareService
ImagingObjectSelection
ImagingStudy
Immunization
ImmunizationRecommendation
ImplementationGuide
List
Location
Media
Medication
MedicationAdministration
MedicationDispense
MedicationOrder
MedicationStatement
MessageHeader
NamingSystem
NutritionOrder
Observation
OperationDefinition
OperationOutcome
Order
OrderResponse
Organization
Parameters
Patient
PaymentNotice
PaymentReconciliation
Person
Practitioner
Procedure
ProcedureRequest
ProcessRequest
ProcessResponse
Provenance
Questionnaire
QuestionnaireResponse
ReferralRequest
RelatedPerson
RiskAssessment
Schedule
SearchParameter
Slot
Specimen
StructureDefinition
Subscription
Substance
SupplyDelivery
SupplyRequest
TestScript
ValueSet
VisionPrescription

AllergyIntolerance
Appointment
AppointmentResponse
AuditEvent
Basic
Binary
BodySite
Bundle
CarePlan
Claim
ClaimResponse
ClinicalImpression
Communication
CommunicationRequest
Composition
ConceptMap
Condition
Conformance
Contract
Coverage
DataElement
DetectedIssue
Device
DeviceComponent
DeviceMetric
DeviceUseRequest
DeviceUseStatement
DiagnosticOrder
DiagnosticReport
DocumentManifest
DocumentReference
EligibilityRequest
EligibilityResponse
Encounter
EnrollmentRequest
EnrollmentResponse
EpisodeOfCare
ExplanationOfBenefit
FamilyMemberHistory
Flag
Goal
Group
HealthcareService
ImagingObjectSelection
ImagingStudy
Immunization
ImmunizationRecommendation
ImplementationGuide
List
Location
Media
Medication
MedicationAdministration
MedicationDispense
MedicationOrder
MedicationStatement
MessageHeader
NamingSystem
NutritionOrder
Observation
OperationDefinition
OperationOutcome
Order
OrderResponse
Organization
Parameters
Patient
PaymentNotice
PaymentReconciliation
Person
Practitioner
Procedure
ProcedureRequest
ProcessRequest
ProcessResponse
Provenance
Questionnaire
QuestionnaireResponse
ReferralRequest
RelatedPerson
RiskAssessment
Schedule
SearchParameter
Slot
Specimen
StructureDefinition
Subscription
Substance
SupplyDelivery
SupplyRequest
TestScript
ValueSet
VisionPrescription

Allergies

AllergyIntolerance

Conditions

Condition

Immunizations

Immunization

Lab Results

Observation

Medications

MedicationDispense
MedicationOrder
MedicationStatement

Procedures

Procedure

Vital Signs

Observation

{}

```
{
  "resourceType" : "Observation"
}
```

```
{
  "resourceType" : "Observation"
}
```

Lab Result *or* Vital Sign

```
{
  "resourceType" : "Observation",
  "id" : "05755F70-FA27-4E3F-9671-EA058C856CC9"
}
```

Lab Result *or* Vital Sign

```
{
  "resourceType" : "Observation",
  "id" : "05755F70-FA27-4E3F-9671-EA058C856CC9"
}
```

Lab Result *or* Vital Sign

Unique Identifier

```
{
  "resourceType" : "Observation",
  "id" : "05755F70-FA27-4E3F-9671-EA058C856CC9"
  "category" : {
    "coding" : [
      {
        "system" : "http://hl7.org/fhir/observation-category",
        "code" : "laboratory",
        "display" : "Laboratory"
      }
    ],
    "text" : "Laboratory"
  }
}
```

Lab Result *or* Vital Sign

Unique Identifier

```
{
  "resourceType" : "Observation",
  "id" : "05755F70-FA27-4E3F-9671-EA058C856CC9",
  "category" : {
    "coding" : [
      {
        "system" : "http://hl7.org/fhir/observation-category",
        "code" : "laboratory",
        "display" : "Laboratory"
      }
    ],
    "text" : "Laboratory"
  }
}
```

Lab Result *or* Vital Sign

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  "resourceType" : "Observation",
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    "coding" : [
      {
        "system" : "http://hl7.org/fhir/observation-category",
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        "system" : "http://hl7.org/fhir/observation-category",
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```

Lab Result *or* Vital Sign

Unique Identifier

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{
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  "category" : {
    "coding" : [
      {
        "system" : "http://hl7.org/fhir/observation-category",
        "code" : "laboratory",
        "display" : "Laboratory"
      }
    ],
    "text" : "Laboratory"
  }
}
```

Lab Result *or* Vital Sign

Unique Identifier

Lab Result

Lab Result

```
      {
        "system" : "http://hl7.org/fhir/observation-category",
        "code" : "laboratory",
        "display" : "Laboratory"
      }
    ],
    "text" : "Laboratory"
  }
  "code" : {
    "coding" : [
      {
        "code" : "2339-0",
        "system" : "http://loinc.org"
      }
    ],
    "text" : "Blood Glucose"
  }
}
```

```
      {
        "system" : "http://hl7.org/fhir/observation-category",
        "code" : "laboratory",
        "display" : "Laboratory"
      }
    ],
    "text" : "Laboratory"
  }
```

Lab Result

```
  "code" : {
    "coding" : [
      {
        "code" : "2339-0",
        "system" : "http://loinc.org"
      }
    ],
    "text" : "Blood Glucose"
  }
}
```

Blood Glucose (LOINC 2339-0)

```
      {
        "code" : "2339-0",
        "system" : "http://loinc.org"
      }
    ],
    "text" : "Blood Glucose"
  },
  "valueQuantity" : {
    "code" : "mg/dL",
    "system" : "http://unitsofmeasure.org",
    "unit" : "mg/dL",
    "value" : 60
  }
}
```

Blood Glucose (LOINC 2339-0)

```
      {
        "code" : "2339-0",
        "system" : "http://loinc.org"
      }
    ],
    "text" : "Blood Glucose"
  },
  "valueQuantity" : {
    "code" : "mg/dL",
    "system" : "http://unitsofmeasure.org",
    "unit" : "mg/dL",
    "value" : 60
  }
}
```

Blood Glucose (LOINC 2339-0)

60 mg/dL

```
    "coding" : [
      {
        "code" : "2339-0",
        "system" : "http://loinc.org"
      }
    ],
    "text" : "Blood Glucose"
  },
  "valueQuantity" : {
    "code" : "mg/dL",
    "system" : "http://unitsofmeasure.org",
    "unit" : "mg/dL",
    "value" : 60
  },
  "encounter" : {
    "reference" : "Encounter/129837645"
  },
  "issued" : "2017-10-18T00:00:00Z",
  "referenceRange" : [
    {
      "high" : {
        "code" : "mg/dL"
```


Blood Glucose (LOINC 2339-0)

60 mg/dL

```
  },
  "issued" : "2017-10-18T00:00:00Z",
  "referenceRange" : [
    {
      "high" : {
        "code" : "mg/dL",
        "system" : "http://unitsofmeasure.org",
        "unit" : "mg/dL",
        "value" : 100
      },
      "low" : {
        "code" : "mg/dL",
        "system" : "http://unitsofmeasure.org",
        "unit" : "mg/dL",
        "value" : 61
      },
      "text" : "61-100 mg/dL"
    }
  ],
  "status" : "final"
}
```

Getting Started with FHIR

HKFHIRResource

```
class HKFHIRResource : NSObject {
}
```

Getting Started with FHIR

HKFHIRResource

```
class HKFHIRResource : NSObject {

    var data: Data { get }
    var resourceType: String { get }
    var identifier: String { get }

}
```

Getting Started with FHIR

HKFHIRResource

```
class HKFHIRResource : NSObject {

    var data: Data { get }
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    var identifier: String { get }

}
```

Getting Started with FHIR

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    var identifier: String { get }

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Getting Started with FHIR

HKFHIRResource

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class HKFHIRResource : NSObject {

    var data: Data { get }
    var resourceType: String { get }
    var identifier: String { get }

}
```

Getting Started with FHIR

HKFHIRResource

```
class HKFHIRResource : NSObject {

    var data: Data { get }
    var resourceType: String { get }
    var identifier: String { get }

}
```

```
let observation = try JSONDecoder().decode(MyCodableObservation.self, from: resource.data)
```

Getting Started with FHIR

HKFHIRResource

```
class HKFHIRResource : NSObject {

    var data: Data { get }
    var resourceType: String { get }
    var identifier: String { get }

}
```

```
let observation = try JSONDecoder().decode(MyCodableObservation.self, from: resource.data)
let value = observation.valueQuantity.value
```

Getting Started with FHIR

HKFHIRResource

```
class HKFHIRResource : NSObject {

    var data: Data { get }
    var resourceType: String { get }
    var identifier: String { get }

}
```

```
let prescriptionsPredicate =
    HKQuery.predicateForClinicalRecords(withFHIRResourceType: .medicationOrder)
```

Getting Started with FHIR

HKFHIRResource

```
class HKFHIRResource : NSObject {

    var data: Data { get }
    var resourceType: String { get }
    var identifier: String { get }

}
```

```
let recordPredicate = HKQuery.predicateForClinicalRecords(source: institutionSource,
                                                          fhirResourceType: .observation,
                                                          identifier: "05755F70")
```

Getting Started with FHIR

Additional considerations

Resources may contain dates

Getting Started with FHIR

Additional considerations

Resources may contain dates

Use source, resource type, and identifier to identify records uniquely

Getting Started with FHIR

Additional considerations

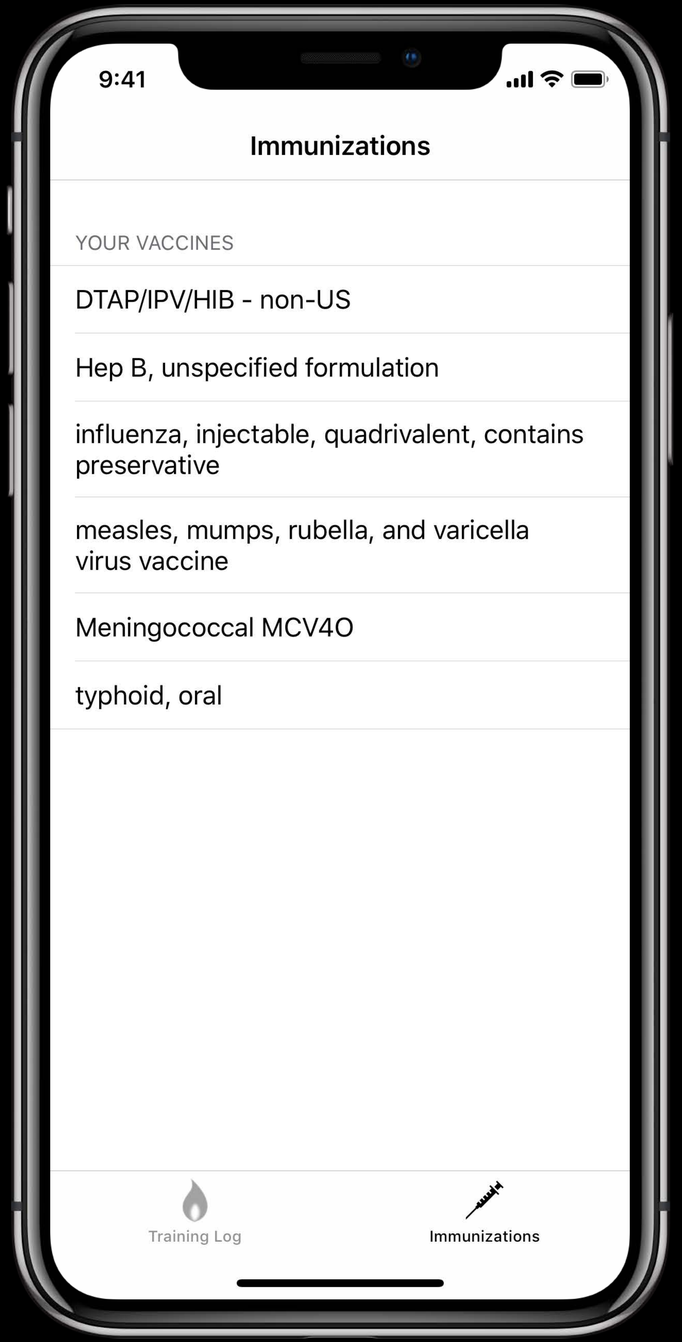
Resources may contain dates

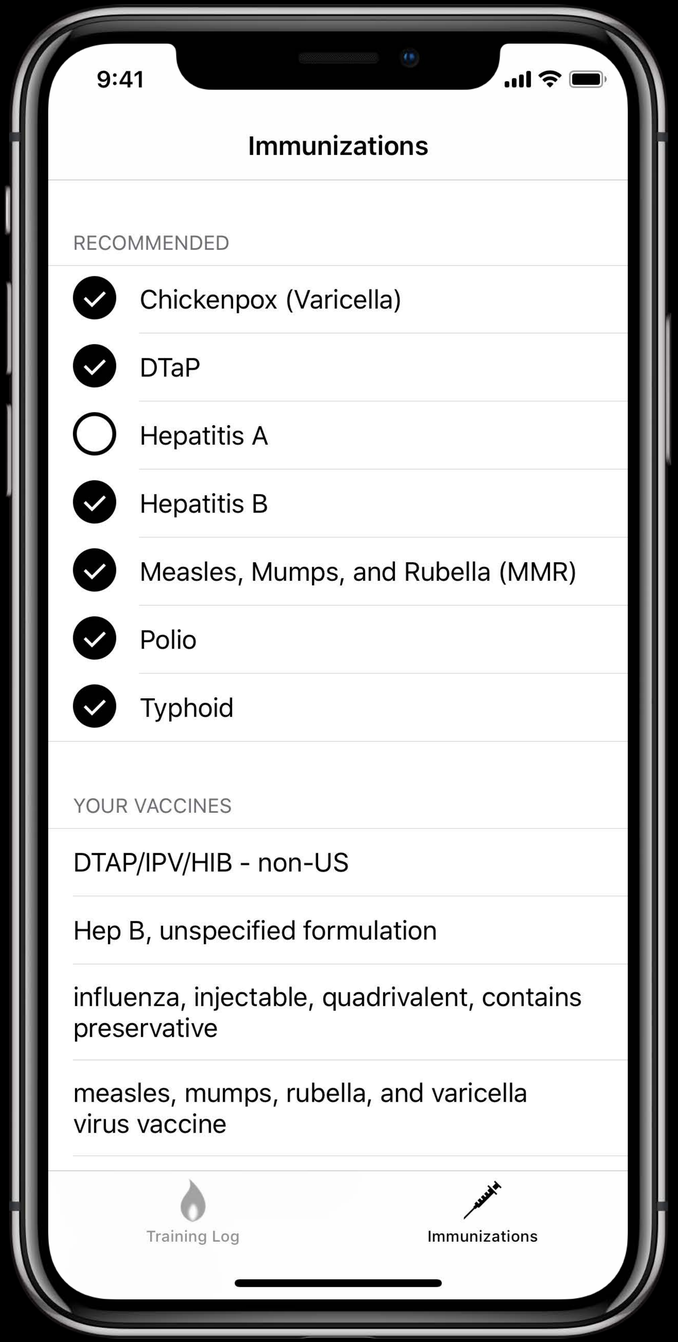
Use source, resource type, and identifier to identify records uniquely

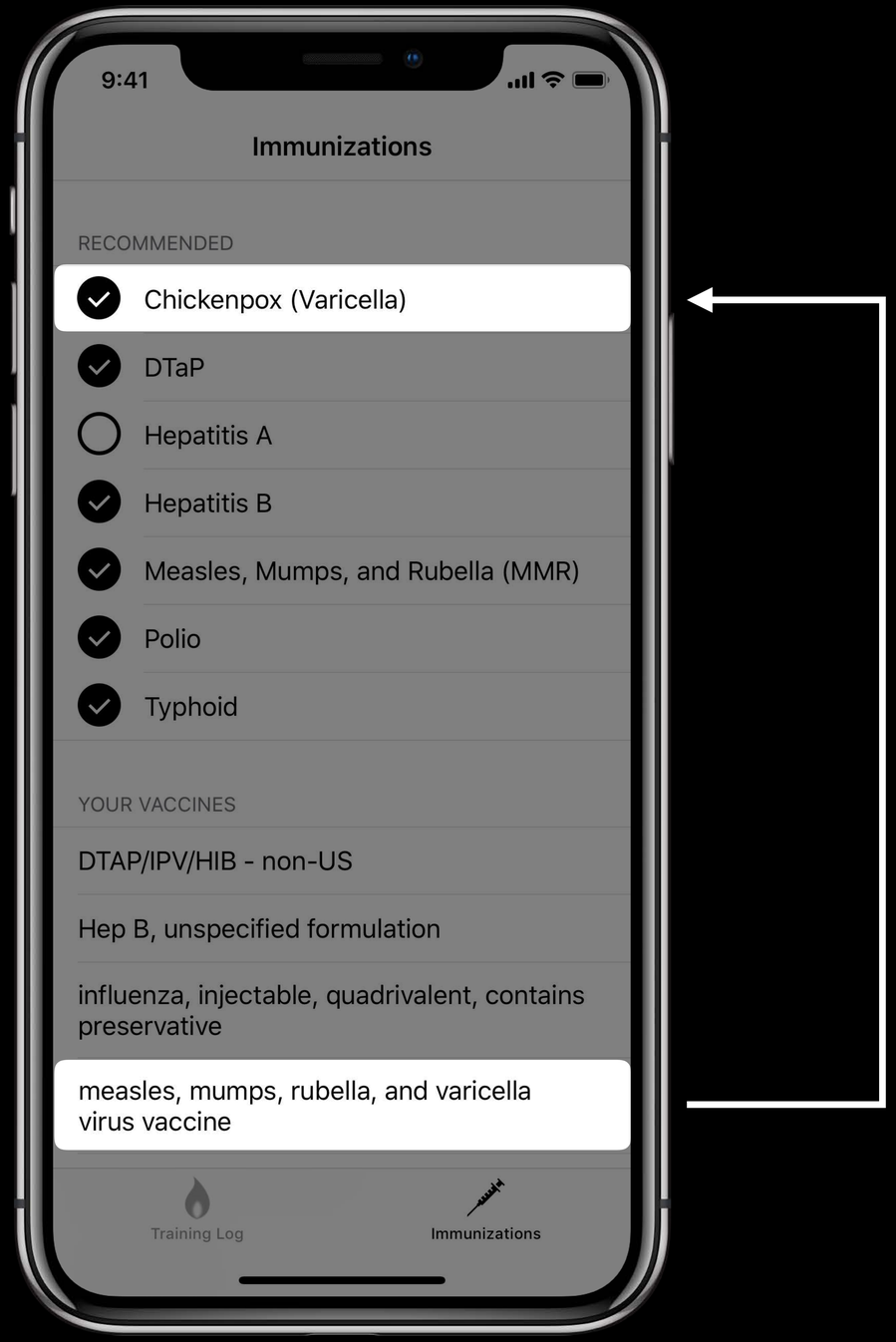
Numerical precision

Demo

Working with FHIR


9:41
Immunizations
YOUR VACCINES
DTAP/IPV/HIB - non-US
Hep B, unspecified formulation
influenza, injectable, quadrivalent, contains preservative
measles, mumps, rubella, and varicella virus vaccine
Meningococcal MCV4O
typhoid, oral
Training Log
Immunizations


9:41
Immunizations
RECOMMENDED
Chickenpox (Varicella)
DTaP
Hepatitis A
Hepatitis B
Measles, Mumps, and Rubella (MMR)
Polio
Typhoid
YOUR VACCINES
DTAP/IPV/HIB - non-US
Hep B, unspecified formulation
influenza, injectable, quadrivalent, contains preservative
measles, mumps, rubella, and varicella virus vaccine
Training Log
Immunizations


9:41
Immunizations
RECOMMENDED
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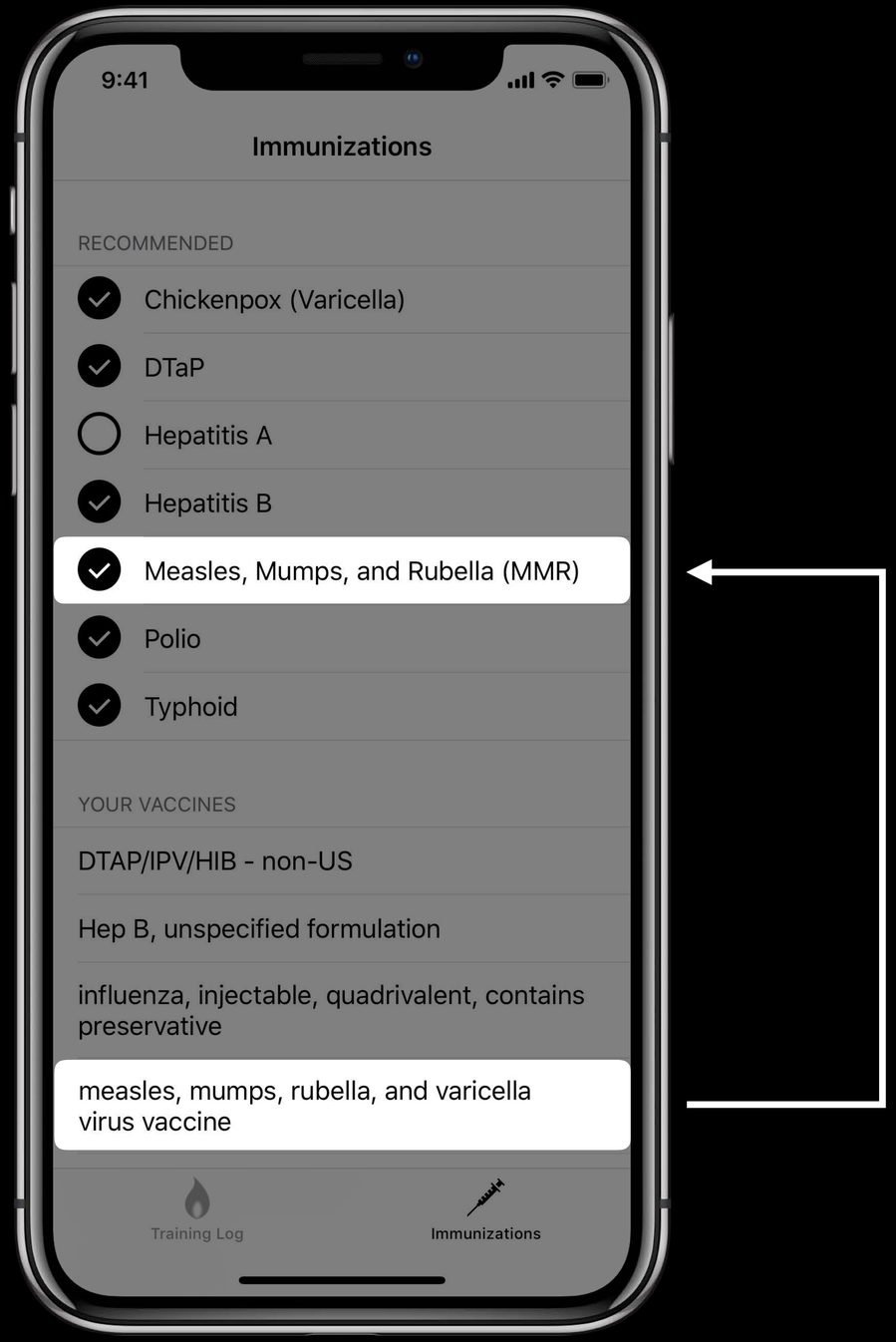
YOUR VACCINES
DTAP/IPV/HIB - non-US
Hep B, unspecified formulation
influenza, injectable, quadrivalent, contains preservative
measles, mumps, rubella, and varicella virus vaccine
Training Log
Immunizations


9:41
Immunizations
RECOMMENDED
Chickenpox (Varicella)
DTaP
Hepatitis A
Hepatitis B
Measles, Mumps, and Rubella (MMR)
Polio
Typhoid
YOUR VACCINES
DTAP/IPV/HIB - non-US
Hep B, unspecified formulation
influenza, injectable, quadrivalent, contains preservative
measles, mumps, rubella, and varicella virus vaccine
Training Log
Immunizations

Demo

Identifying chickenpox immunity

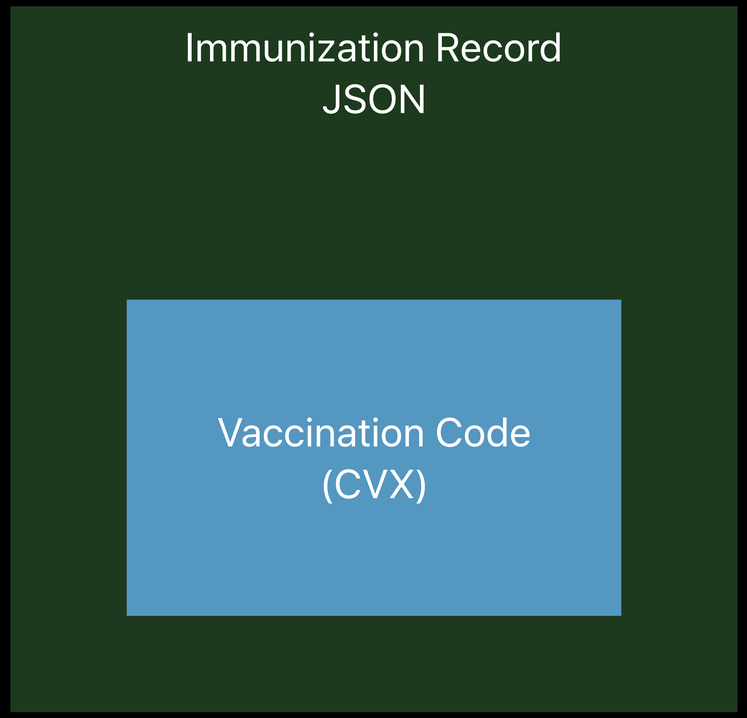
Demo

Identifying chickenpox immunity

Immunization
Record
JSON

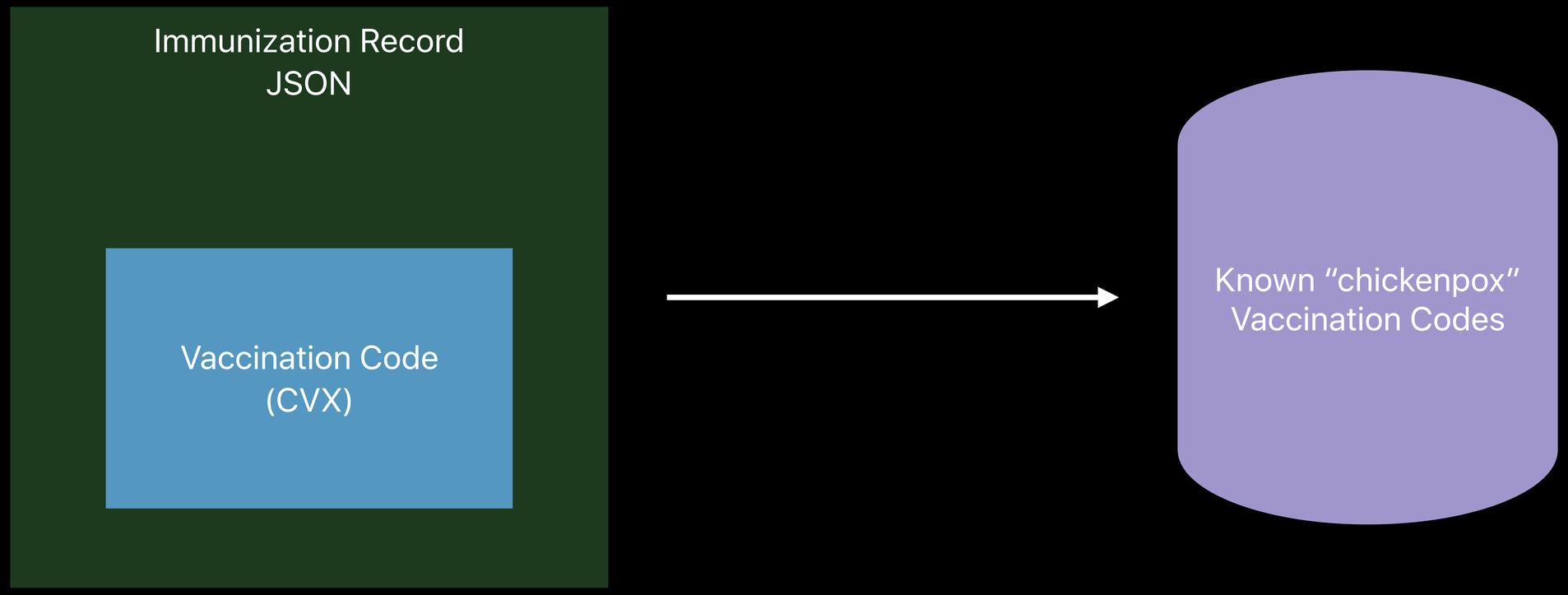
Demo

Identifying chickenpox immunity



Demo

Identifying chickenpox immunity



Demo

Identifying chickenpox immunity

Immunization
Record
JSON

```
{
    "resourceType": "Immunization"
}
```

```
{
    "resourceType": "Immunization"
}
```

Immunization

```
{
    "resourceType": "Immunization",
    "vaccineCode": {
    }
}
```

Immunization

```
{
    "resourceType": "Immunization",
    "vaccineCode": {
        "coding": [
        ]
    }
}
```

Immunization

Immunization

```
{
    "resourceType": "Immunization",
    "vaccineCode": {
        "coding": [
            {
                "system": "http://hl7.org/fhir/sid/ndc",
                "code": "0006-4171",
                "display": "PROQUAD"
            },
            {
                "system": "http://hl7.org/fhir/sid/cvx",
                "code": "94",
                "display": "measles, mumps, rubella, and varicella virus vaccine"
            }
        ]
    },
    ...
}
```

```
{
    "resourceType": "Immunization",
    "vaccineCode": {
        "coding": [
            {
                "system": "http://hl7.org/fhir/sid/ndc",
                "code": "0006-4171",
                "display": "PROQUAD"
            },
            {
                "system": "http://hl7.org/fhir/sid/cvx",
                "code": "94",
                "display": "measles, mumps, rubella, and varicella virus vaccine"
            }
        ]
    },
    ...
}
```

Immunization

National Drug Code (NDC)

```
{
    "resourceType": "Immunization",
    "vaccineCode": {
        "coding": [
            {
                "system": "http://hl7.org/fhir/sid/ndc",
                "code": "0006-4171",
                "display": "PROQUAD"
            },
            {
                "system": "http://hl7.org/fhir/sid/cvx",
                "code": "94",
                "display": "measles, mumps, rubella, and varicella virus vaccine"
            }
        ]
    },
    ...
}
```

Immunization

CVX

Immunization

```
{
    "resourceType": "Immunization",
    "vaccineCode": {
        "coding": [
            {
                "system": "http://hl7.org/fhir/sid/ndc",
                "code": "0006-4171",
                "display": "PROQUAD"
            },
            {
                "system": "http://hl7.org/fhir/sid/cvx",
                "code": "94",
                "display": "measles, mumps, rubella, and varicella virus vaccine"
            }
        ]
    },
    ...
}
```

MMRV (CVX 94)

```
{
    "resourceType": "Immunization",
    "vaccineCode": {
        "coding": [
            {
                "system": "http://hl7.org/fhir/sid/ndc",
                "code": "0006-4171",
                "display": "PROQUAD"
            },
            {
                "system": "http://hl7.org/fhir/sid/cvx",
                "code": "94",
                "display": "measles, mumps, rubella, and varicella virus vaccine"
            }
        ]
    },
    ...
}
```

Immunization

MMRV (CVX 94)

Demo

Working with FHIR

Protecting User Privacy

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Clinical data can be extremely sensitive

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Users expect privacy to be built-in

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Privacy is about people

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Privacy is about people

Establish a relationship of trust

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Summary

New sample types

Authorization and access

Getting started with FHIR

Protecting user privacy

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More Information

https://developer.apple.com/wwdc18/session706

Health and Fitness Technologies Lab	Technology Lab 2	Tuesday 3:45PM
New Ways to Work with Workouts	Hall 3	Wednesday 9:00AM
Health, Fitness, and Research Get-Together	Market Terrace	Wednesday 6:15PM

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